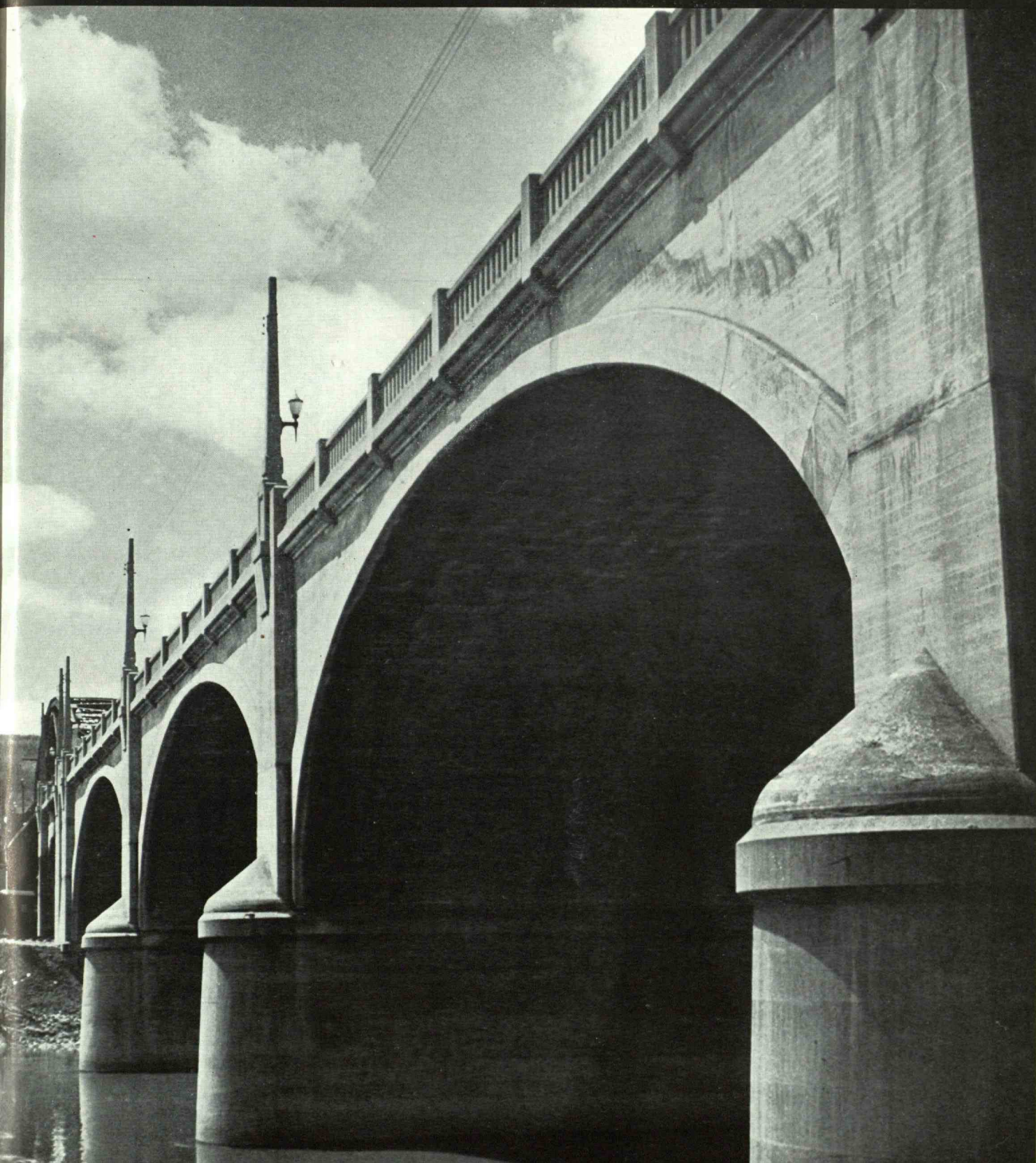


TECHNOLOGY

REVIEW *February* 1950



technology review

Published by MIT

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Do your Plants grow like Topsy?



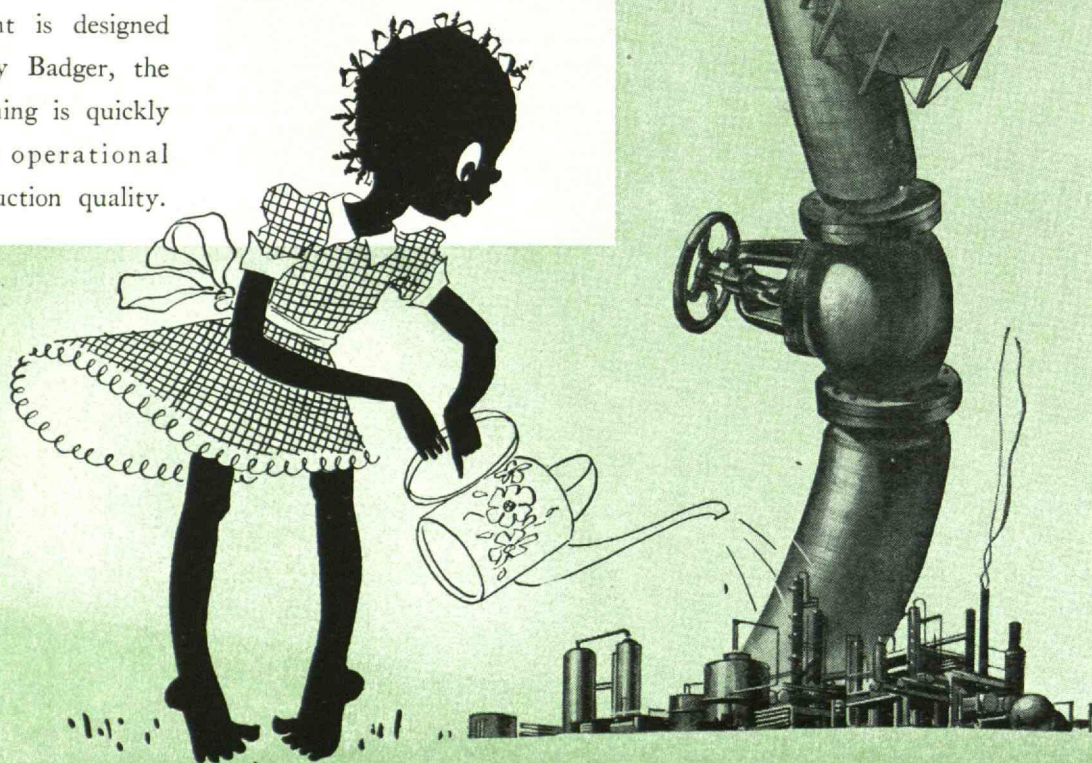
A Badger plant is not like Topsy
—it doesn't just grow. A Badger

built plant is thoroughly planned and planned with
imagination and experience.

This planning is apparent in orderly layout of all component parts
for easy operation and efficient control. It is apparent in the location
of equipment for ready access when maintenance or replacement is
required.

Less apparent, but of equal importance, is the attention paid to
longer range factors such as the need for future expansion and the effect
of reasonably foreseeable technical developments and improvements.

When your plant is designed
and constructed by Badger, the
value of this planning is quickly
demonstrated by operational
economy and production quality.

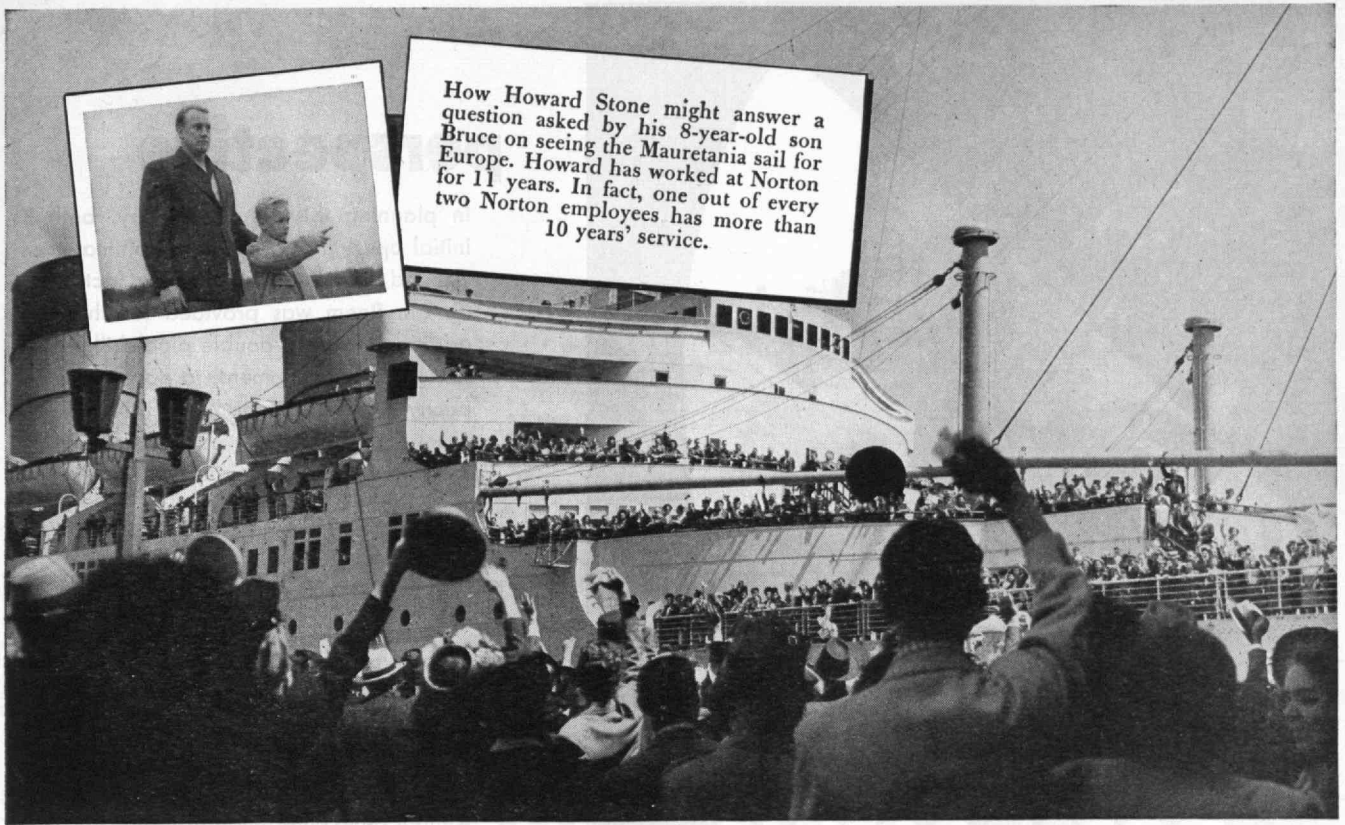


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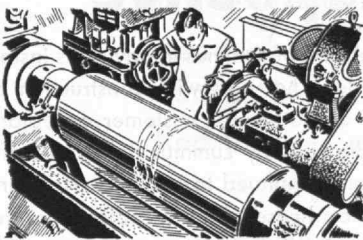
Process Engineers and Constructors for the Petroleum, Chemical and Petro-Chemical Industries



How Howard Stone might answer a question asked by his 8-year-old son Bruce on seeing the Mauretania sail for Europe. Howard has worked at Norton for 11 years. In fact, one out of every two Norton employees has more than 10 years' service.

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"So, you see, Bruce, in these ways and many more Norton has a hand in making modern ships bigger and better... another proof that I'm not boasting when I say 'Norton makes better products to make other products better'."

NORTON

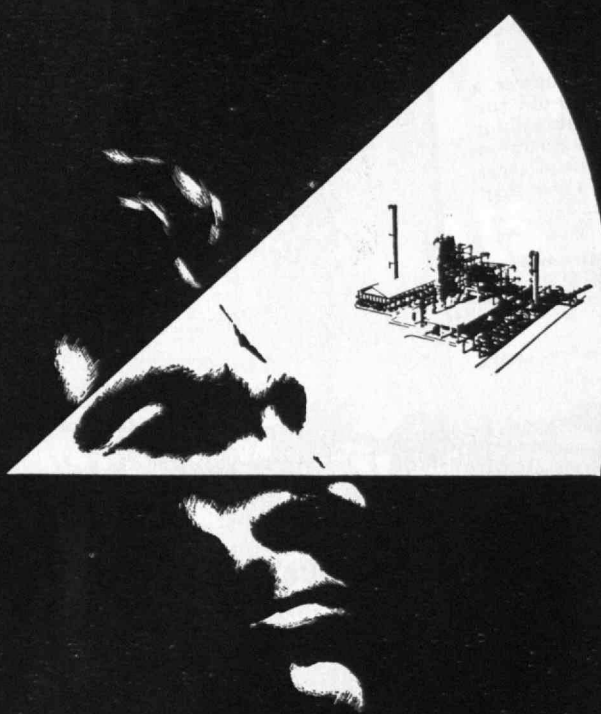
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perspective

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Esquina Las Gradillas, Caracas, Venezuela



perspective

In planning this French refinery, both its initial operating level and its ultimate, expanded capacity were guiding factors for design. Room was provided for the easy addition of filters, double pipe chillers and refrigeration equipment, to double the capacity of the unit in this respect. An efficient plant today, it will be equally efficient tomorrow, because expansion need never be "makeshift."

perspective

Lummus catalytic cracking plants, war-built for 100-octane gasoline, are being operated to produce motor gasoline of lower octane rating on a consistent low-cost basis. Their suitability for this latter service was attained without any compromise in design for their original purpose. Rather, the Lummus-engineered design had the flexibility to meet requirements for the efficient production of either fuel.

perspective

The interest of Lummus in any of its installations does not end with construction and initial operation for customer acceptance. Periodic visits by Lummus field representatives are continued to review performance. In a recent case where a radical change in product requirements arose, these operating checkups furnished valuable aid in arriving at a prompt and practical plant modification to meet the new demands.

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teamwork

economy

fulfillment

resourcefulness

technique

Cabot Publications Offer Carbon Black Answers

Cabot books and pamphlets, available upon request, have been especially prepared by Cabot technicians to help users of carbon black to meet numerous requirements for quality in specific industries.

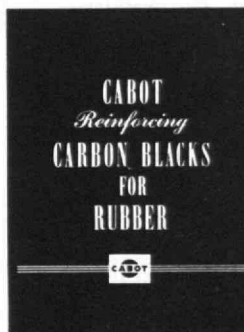
Read about the performance and behavior of carbon black in its many applications, and you may find that a Cabot Carbon Black in your product can make it better.

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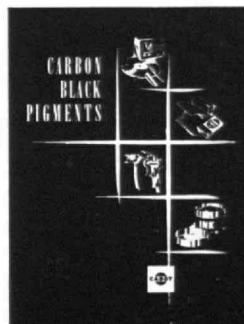
*The Cabot staff is ready to talk with you
about your problems at any time.
Ask about other Cabot Publications
which may be useful to you.*



CABOT REINFORCING CARBON BLACKS FOR RUBBER

Rubber chemists and compounders like this 60-page book, because it contains graphs and tabulation data of analytical tests in Natural Rubber, GR-S, and Neoprene. The specific sets of properties are given for each type of carbon black at various loadings.

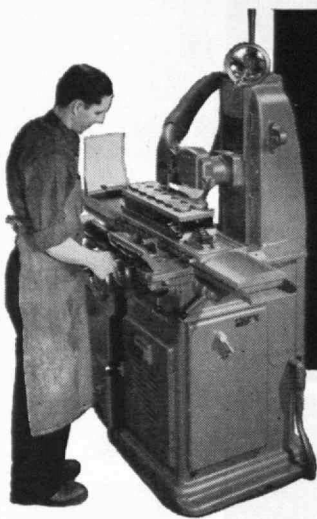
Write for



CARBON BLACK PIGMENTS

Here is a 16-page, spiral-bound book containing a list of Cabot carbon black pigments; packing information; descriptions of special blacks for paint, ink, plastics and paper; electrical properties; testing procedures; technical data; and a list of agents selling Cabot products





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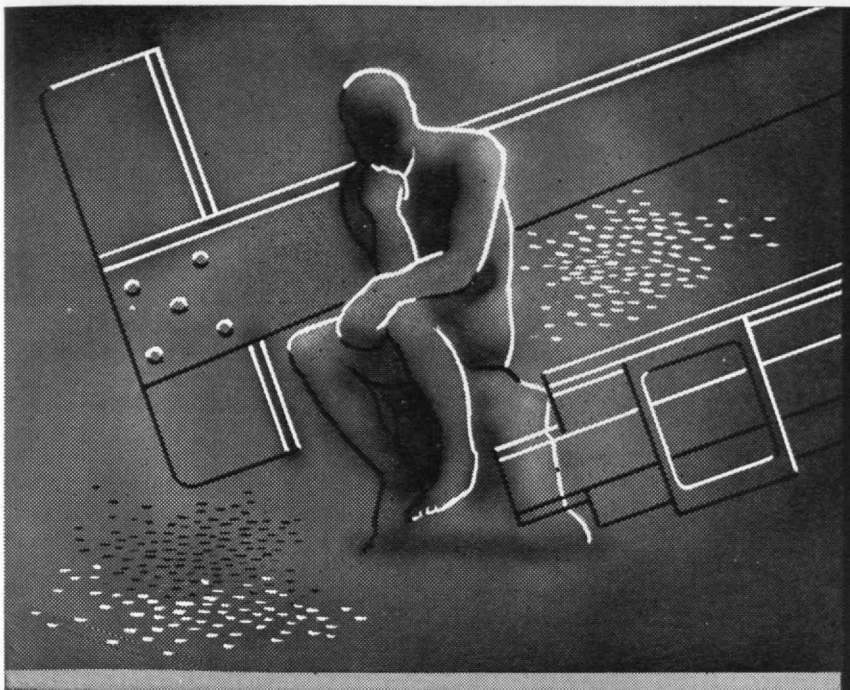
DIEFENDORF  **GEARS**

THE TABULAR VIEW

War's Weapons.—In the flush of forthcoming victory, during the early half of 1945, enthusiasm ran high that the end of World War II would bring about conditions propitious to the formation of a truly unified "one" world. The need for international unity was dramatically foreshadowed before a small group of scientists on the white sands of Los Alamos in July, 1945, and the public was initiated into the need for a new kind of international thinking by subsequent events in Nagasaki and Hiroshima. As the Iron Curtain descended and divided the world into two antagonistic camps in a cold war, new reasons were found for pursuing the search for world unity and responsible international agreements. The search is still going on and many able minds make their contribution toward this desirable objective. One such attempt is contained (page 203) in "The Weapon of the Next War" by M. H. WILLIAMS who prefers to be known merely as a "student of geopolitics, teacher, writer, and veteran of World War II." The first of this two-part article discusses the characteristics of some modern instruments of war. The second part, to appear in the March issue, examines the probable nature of a future war.

Wholesome World.—The search for the wholesome world is likewise sought by M. F. ASHLEY MONTAGU, Head of the Department of Anthropology at Rutgers University, and formerly a member of the faculty of the Hahnemann Medical College and Hospital of Philadelphia. His article in this issue, "Living in an Atom-Bomb World" (page 205), is primarily a plea for unified and responsible world government, which Dr. Montagu sees as the only solution to the world's present ills. Although addressed primarily to members of our Western civilization—because they are within range of a free press—Dr. Montagu's admonitions apply with equal force to the "democracies" of force, concentration camps, and police states. A keen student of mankind and his ethics, or lack of ethics, Dr. Montagu is particularly well qualified to deal with the topic in this issue. His past achievements include the making of the film *One World or None* for the National Committee on Atomic Information which has been described as the "most effective documentary ever made."

Watery Wharf.—"The Delayed Invention" by WILLY LEY (page 207) is a rather unusual story which brings into sharp focus the turn of events which may be expected to come about occasionally in a rapidly growing field of technology. Underlying Mr. Ley's story is a valuable lesson in economics as related to technological progress, for the transoceanic islands originally proposed to facilitate long-distance flying were made obsolete by rapid progress in aeronautics. As one of its editorial associates, Mr. Ley is a frequent contributor to *The Review*. In the general area of New York City, he is also in demand as a lecturer on rockets and related problems. Of several books to his credit, the latest is *The Conquest of Space*.



Thinking of improving

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MAIL RETURNS

Mathematical Myopia

FROM GEORGE D. ATWOOD, '00:

While reading an interesting article on the conservation of minerals in the January, 1950, issue of *The Review*, I was surprised at the statement that the year 1950 was the beginning of the sixth decade of the Twentieth Century. Had this been written by a Harvard man, I might understand his mental confusion, but appearing in an official publication of M.I.T., it is, to say the least, discouraging.

Perhaps we should have fifth-grade arithmetic as a requirement for entrance examinations, or possibly some of your editorial staff should be informed that the first year of a decade is one and the last year of a decade is 10. Of course, I am too old to know — perhaps you have a new numerical system since my last days at M.I.T. in 1900. *Brooklyn, N.Y.*

[Mr. Atwood undoubtedly refers to the opening sentence on page 156 in the article "The Twentieth Century Mid-Point" where reference is made to the earth swinging "into the orbit that will mark the first year of the sixth decade of the Twentieth Century . . ." We wish we had made a qualifying statement (as did some other publications) that the end of 1950, rather than the beginning, marks the mid-point of our century, and the beginning of the sixth decade. We should like to be able to pass off this slip onto our printer, The Hildreth Press, Inc., who has just gone through the pains of moving from Brattleboro, Vt., to Bristol, Conn. But honesty compels us, with a red face, to embrace this oversight as our very own. — Ed.]

Congratulations for Camerists

FROM CLINTON C. KEMP, '43:

I find the articles in *The Review* very interesting indeed, and also feel like commending you frequently on the photographs included with them. However, I think you deserve very special congratulations for the three pictures illustrating the article on gossip in the December, 1949, issue. They are first rate! *Hamilton, Ohio*

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Alfred T. Glassett, '20 Vice President



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YES, through a dramatic new process known as *jet-piercing* . . . holes can now be *burned* straight and true through solid rock! The harder the rock the more efficient the operation! A special combination of oxygen, fuel, and water does the job . . . and in a fraction of the time required by the old drill attack.

This process is of particular significance to the steel industry today. Why? Because government surveys show that America's reserves of top-grade iron ore—source of steel—are fast being reduced. But there remain almost inexhaustible beds of the once scorned low-grade iron ore called *taconite*.

The extremely hard and dense nature of *taconite* makes usual mining methods too costly and impractical. But the jet-piercing process—with 1/10 the equipment and at a reasonable cost—will burn holes straight into the solid *taconite* so that it can be blasted into lumps of usable size.

Also, destructive abrasion from the sharp-edged rock on loading and crushing equipment is being better controlled

by machine parts made from extra-hard alloy steels. And to concentrate the iron content of the ore, new chemical processes can flush away much of the "waste" matter—thus leaving an ore 30% richer, for more efficient smelting.

The people of Union Carbide created the jet-piercing flame process as well as many of the alloys, chemicals, and other materials essential to today's mining efficiency. And UCC stands ready to help solve problems in other fields of American enterprise . . . wherever better basic materials and better processes are needed.

FREE: If you would like to know more about many of the things you use every day, send for the illustrated booklet "Products and Processes." It tells how science and industry use UCC's Alloys, Chemicals, Carbons, Gases, and Plastics. Write for free Booklet J.



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Me!...
a V.P. at 33



**because I said
"TAKE IT TO TAFT-PEIRCE"**

"... but I can't touch that retooling for six months," I said.

"Why not?" The Old Man's tone was ominously silky.

"Well... there's the Charlesville project, Bill Newton's job and..."

Majestically the Boss started to rear all five feet of him into Napoleonic stance number one.

"Here it comes," I thought. "Trouble with a capital T." Then, just in time, I had an inspiration.

"Let's Take It To Taft-Peirce," I almost shouted.

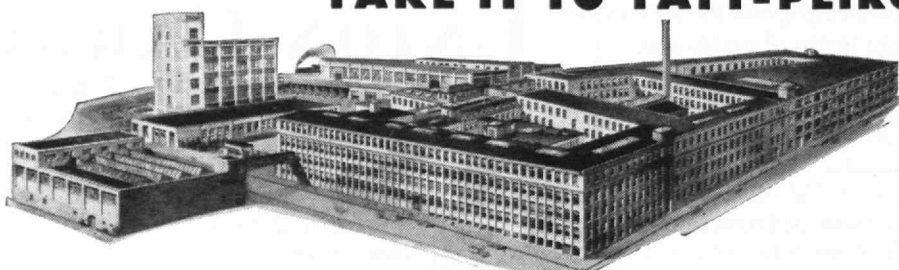
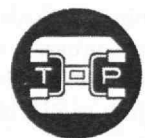
That did it. He stopped... beamed. And now I'm a V. P.

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TAKE IT TO TAFT-PEIRCE



What GENERAL ELECTRIC People Are Saying

E. E. CHARLTON,

Research Laboratory

MEDICAL ELECTRONICS: In medical x-ray diagnosis we have, in the last few years, seen the use of the fluoroscope decrease in comparison with the radiography. Why has this been? The reason is twofold. The patient and the doctor were both subjected to so much radiation that the hazards of radiation damage imposed severe limitations on adequate and flexible fluoroscopic techniques. Furthermore, these hazards imposed the use of low x-ray intensities yielding screen images of such low luminosity that the limitations of the human eye precluded high resolution; that is, the recognition of fine detail. The enforced requirement of low x-ray intensity also brings with it the necessity of a 15- or 20-minute period for dark adaptation of the eyes in preparation for the fluoroscopic examination. The doctor must also limit his examination to brief glimpses rather than a more detailed study of the screen image. If the required x-ray intensities for examination could be reduced and the fluoroscopic picture sufficiently increased in brilliance, these limitations would be largely dissipated.

It seems certain that electronics will come to the rescue in this problem by removing many and perhaps all of these limitations. Of various systems that have been proposed and are being investigated, one that holds great promise makes use of some form of electron image tube and embodies some of the principles of the wartime sniperscope, by which our soldiers were enabled to see the enemy in the dark . . . Such an x-ray image tube intensifier offers the possibility of an amplification of as much as several hundred fold in brightness while at the same time increasing resolution. Successful attainment of this goal will not only greatly enhance the usefulness of the fluoroscopic method but will also facilitate photographic recording of the image, especially in those cases where moving pictures are desired. A full realization of all that the method promises would be quite revolutionary in the x-ray art.

*Inter-American Congress of Surgery,
Chicago,
October 21, 1949*

A. H. TAYLOR,

Lighting Research Laboratory

MOLD CONTROL: Every housewife has experienced the loss of foodstuffs by reason of molds. Likewise, manufacturers of many products incur losses produced by mold contamination at some point in the manufacturing process. In total these losses amount to millions of dollars yearly; consequently, any practical method of reducing losses due to molds should be of great general interest.

Air-borne mold spores, originating in decaying animal and vegetable matter, are more widely distributed in outdoor and indoor air than is generally recognized . . .

It has long been known that bacteria could be killed by suitable exposures to ultraviolet, but little was known regarding its effect upon air-borne mold spores. The introduction of germicidal lamps . . . made it feasible to apply them to the disinfection of air, some liquids, and the surfaces of solids. Researches . . . have shown that the mold spores can also be inactivated by the germicidal ultraviolet energy, but that the required dosages are much higher than for most bacteria . . .

Although mold spores are much more resistant to germicidal ultraviolet than are the mixed organisms in saliva, . . . it should be possible to reduce economic losses due to mold contamination—especially during manufacturing processes—by practicable installations of germicidal lamps. Furthermore, they can be applied to upper-air irradiation of occupied rooms without exceeding intensities safe for the occupants of the rooms. Thus personnel and product protection can be promoted simultaneously with the same installation of germicidal lamps. Applications of localized high-intensity radiation over production lines, such as bottling or canning, are being used with good results in many places. While it is unreasonable to expect the germicidal lamps to completely

eliminate economic losses due to molds, such losses can be materially reduced.

*American Public Health Assn.,
New York City,
October 28, 1949*



K. E. WAKEFIELD,

*General Engineering & Consulting
Laboratory*

MAGNETIC CLUTCH: Much interest has been evidenced in the National Bureau of Standards' recent report that so-called "magnetic" fluids, consisting of finely divided iron powder mixed with light oil, can be utilized with great efficiency as a medium for binding together two parallel surfaces between which a magnetic field has been produced. Such an arrangement can be readily set up in the form of a clutch and, because of this, the mechanism became known as the "magnetic fluid clutch." . . .

The magnetic fluid clutch consists primarily of two parallel magnetic surfaces separated by a small gap that is filled with a mixture of oil and finely divided iron powder. The surfaces may be two parallel disks or concentric cylinders, each rotating independently of the other about a common axis. The unit contains a coil to produce magnetic flux in the region between the surfaces, and a return path for the flux is provided. Provision is also made to seal in the iron-oil mixture to prevent leakage.

If no magnetic field is present, the force restraining relative motion between the two surfaces is produced only by the viscous drag. In the presence of a magnetic field, however, the fluid seemingly solidifies and the restraining force becomes very great. Thus the device adapts itself well to a clutching or braking operation.

*General Electric Review,
December, 1949*

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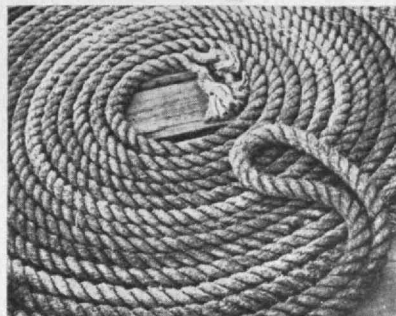


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Nettie L. Smith from Black Star

THE TECHNOLOGY REVIEW

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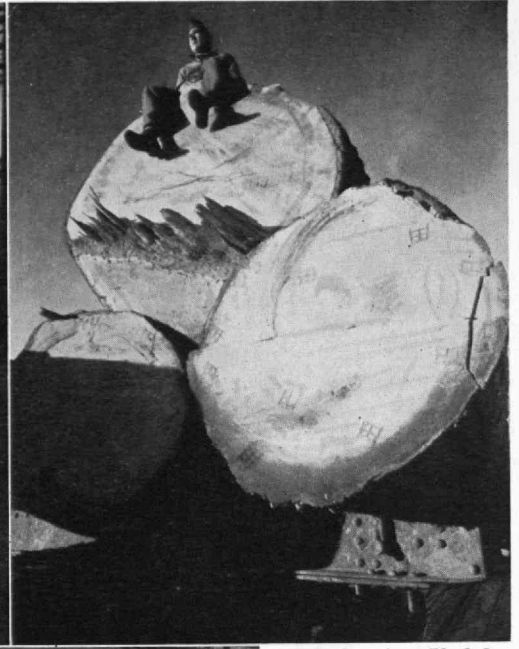
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K. H. Strelow from *Black Star*

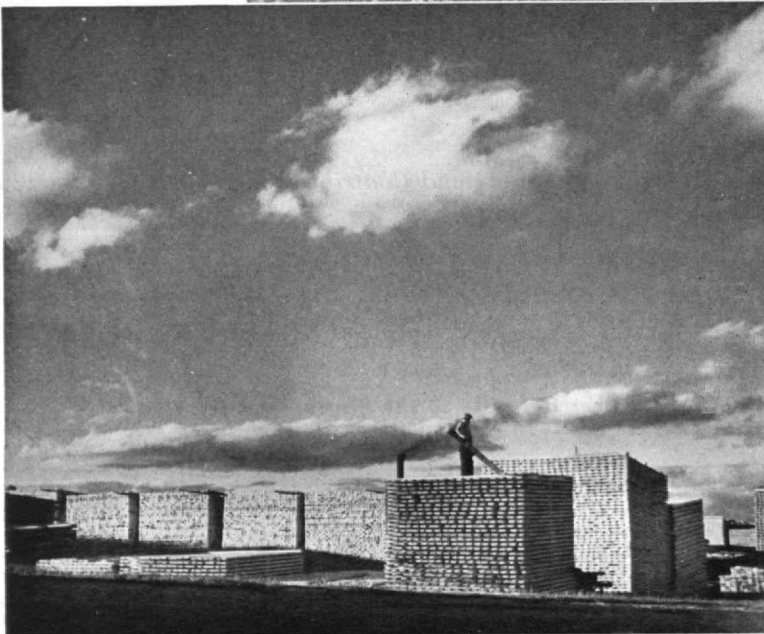


J. B. Guss from *Black Star*



Ronny Jaques Studio
from *Black Star*

H. Armstrong Roberts



Timber!

The population of the United States has increased 75 per cent during the past four and a half decades, and our material acquisitions have multiplied in the interim. Yet, lumber production, which reached its peak of 46,000,000,000 board feet in 1906-1907, dropped to an annual average of about 31,000,000,000 board feet in the 1935-1945 decade. The more efficient use of forest products (in which plywood and similar laminated materials replace solid woods, and in which pulp products compete with sawn lumber and wood in natural form) has aided in conserving an important national resource. The rise of plastics and the substitution of metals have also contributed to this trend; and losses from forest fires have taken a dip in recent years. But lumbering of today, with its mechanization, as shown in these views from Washington and Northern Ontario, is enjoying a postwar boom.

THE TECHNOLOGY REVIEW

Vol. 52, No. 4



February, 1950

The Trend of Affairs

Studying the Weather with Radar

MICROWAVE radar is being developed in the Department of Meteorology as a new tool for tracking and studying the detailed behavior of storms. With the new technique, the location and path of areas of precipitation can be determined. In addition, the local variations in intensity of precipitation and the internal movements within the storm area may be estimated. Within the foreseeable future, the new tool holds promise of enabling aircraft traffic towers to employ their present radar sets for local storm observations and, thereby, to assist planes in avoiding turbulences, icing, and other unfavorable weather conditions. Although of less immediate application, the knowledge which is gained from radar storm tracking finds extensive use in supplementing other weather data so that long-range weather forecasts may be brought one step closer to realization.

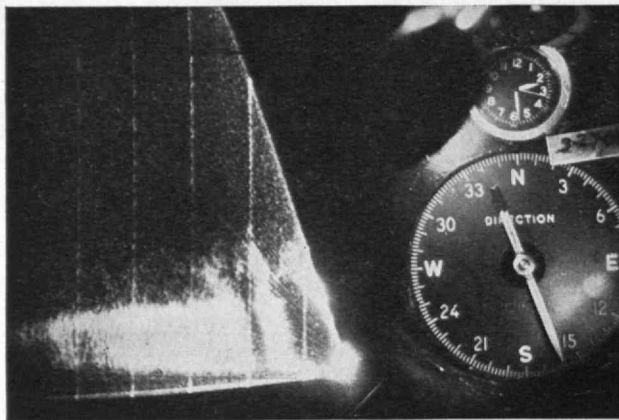
Weather radar is a postwar research project which owes its origin to the intense development of military radar techniques during World War II. Early in this development, it was found that the high-power, very short wave pulses sent out from a radar transmitter were reflected and returned to the radar receiver by areas of precipitation; but thorough exploitation of this discovery had to await the completion of the war. The program under way at M.I.T. was initiated early in 1946 through a contract placed by the Army Signal Corps with M.I.T.

Prior to the use of radar, the meteorologist had no way of obtaining an instantaneous picture of a storm over a large area. If there were numerous observation posts simultaneously taking data throughout a storm, it would be possible to reconstruct detailed pictures of the disturbance; but even with a prohibitively large number of such observation posts, details would be missed which are picked up and presented instan-

taneously by radar. The entire atmosphere is now scanned for a radius of over 100 miles, and all regions of precipitation throughout this area are indicated on the screen of an oscilloscope.

The principle of the scheme is that water droplets and ice particles cause backscattering of radio energy in the three- to 10-centimeter wave length range. The intensity of the backscattering is proportional to the sixth power of the drop diameter. Very small drops scatter a negligible amount of the radar beam, and it happens that the intensity of scattering first becomes measurable as the drops reach a size about large enough to start falling. Clouds, therefore, are detected only at very short ranges. The intensity of the precipitation echo signals depends both on the size and number of the drops, as well as their distance from the observation post; therefore, a given pattern on the radar oscilloscope might be produced by different combinations of numbers and sizes of drops at different distances. Actually, the following three types of measurements are obtained: (1) the geographical location in space of the echoes, and their vertical extent, (2) the average intensity of the echo from any chosen region, and (3) the fluctuations in intensity of the echo from any chosen region which are functions of the velocities of the rain drops. Such data must be interpreted in meteorological terms.

The research group in the Department of Meteorology, working under the direction of Alan C. Bemis, '30, research associate, have three radar units, all of which are operated during any storms in the neighborhood of Cambridge. Two of the sets operate at three centimeters wave length, and the third at 10 centimeters. One of the three-centimeter sets is a new one having a narrow conical beam producing images of sharp definition. It was designed especially for weather studies by the Army Signal Corps. The other two are essentially World War II military sets.



Photographic reproduction of image on range-height indicator radar scope, showing a vertical section through a storm running for 60 miles southeasterly from M.I.T. The horizontal stratification occurs just below the freezing level.

To date, these sets have been employed primarily in an analysis of the meteorological meaning of the radar scope pictures. During a storm, an airplane is flown through those regions of precipitation which appear on the radar scope. The plane collects data on the local values of the total liquid water content per unit volume, the size distribution of the rain drops or ice particles, the shape of ice particles, and the relative motion of the particles. This latter can only be estimated indirectly from the vertical accelerations of the airplane. The position of the airplane is followed by radar tracking, and accurate radar measurements of the storm near the plane are taken simultaneously with those using instruments in the plane.

In recent months, the analysis has been greatly expedited by the perfection of an instrument capable of measuring the size of rain drops from an airplane. In this instrument, individual water particles intercept a very narrow light beam which is directed at a photoelectric cell. The larger the particle, the greater will be the fraction of the light that is intercepted. Hence, the size of each water particle is transformed into an electric pulse each of which can be measured and counted automatically.

In addition to improving the interpretation of radar data, the meteorology group is already applying the method to investigating storm structure. Permanent radar records have been made of nearly all of the storms passing through the Cambridge area in the past two years. One particularly interesting observation is the location of the freezing level in the atmosphere, illustrated in the photograph at the left of the page. This picture results from a vertical sweep of the radar beam. The bright horizontal band represents the region where snow is melting to rain since liquid water is more strongly reflecting than snow.

Another interesting observation is shown in the photograph at the right where the radar beam is rotated in a horizontal plane. In this case, although the storm may appear to an observer at any one spot as a general steady rain, the radar screen shows it to have a complicated structure of intense and light precipitation zones. The course of the plane investigating precipitation characteristics of such zones can be readily traced on the display of the radar scope.

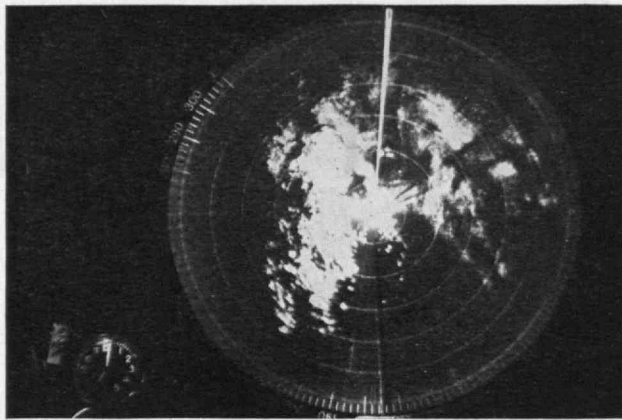


Image as seen on a plan-position indicator radar scope, showing widespread rain echoes extending over an area more than 200 miles in diameter. Some of the small intense spots are echoes from airplanes.

New Synthesis of Peptides

PEPTIDES, in the form of their more complicated protein cousins, constitute the principal components in skin, hair, horn, and other biological tissues. In the body, peptides are made naturally under simple, normal conditions, at low (body) temperatures, in aqueous solutions, and without harsh chemical reagents. In the past, chemists have been able to prepare peptides by methods involving elevated temperatures, non-aqueous solvents, and corrosive substances; but until recently, they have not been able to approach nature's method of achieving the same result. In the last eight years, a theory has been worked out to explain nature's method of preparing peptides. Recent studies, conducted at the Institute's Department of Chemistry, represent a preliminary attempt to duplicate this method of preparation.

The chemical combination of amino acids has its own value as a mode of peptide production, but, probably more important, the reactions themselves provide penetrating insight into protein chemistry. Knowledge of protein structure gained through the synthesis and study of relatively simple peptides has contributed enormously to a better understanding of the chemical nature of toxins, antibodies, hormones, enzymes, and viruses. With the recent discoveries of the peptide nature of certain antibiotic substances, including gramicidin, tyrocidin, and diplococcin, there is renewed interest in practical methods for the synthesis of peptides.

An interesting approach has been made to the duplication of nature's own way of synthesizing peptides, which, like their more complex relatives, the proteins, are composed of repeating amino acid structural units. Although chemical methods are known for joining together amino acid molecules to form simple peptides, none of these resemble the route used in living cells. According to currently accepted theory, the natural synthesis of peptides proceeds by an activation of the amino acid carboxyl group by combination with phosphoric acid.

In a forthcoming issue of the *Journal of the American Chemical Society*, John C. Sheehan and Victor S. Frank, '42, describe the first successful preparation of peptides using synthetic, energy-rich, phos-

phorylated amino acid derivatives. The reactions were carried out at room temperature, in neutral aqueous solution, thus simulating physiological conditions. During the past year, the same persons developed a second promising new technique for preparing peptides as reported in the *Journal of the American Chemical Society* for May, 1949.

This new method of synthesis has several advantages over those previously used. The primary advantage is that 60 to 70 per cent of the amino acids can be converted into the desired peptide, whereas previous methods gave 20 to 50 per cent yield. The steps in the new synthesis are considerably simpler to carry out and, in many cases, much less time-consuming. Furthermore, sulfur-containing compounds present no special problem, although they are difficult to handle by conventional means.

It is anticipated that the new synthesis will contribute to a better understanding of the chemical nature of toxins, allergy-producing agents, hormones, enzymes, and viruses, by facilitating the synthesis and study of peptide models. It is possible that the advantage of the new method will permit synthesis of some simpler, naturally occurring peptides of interest in the medical world.

Transients in Hydroelectric Systems

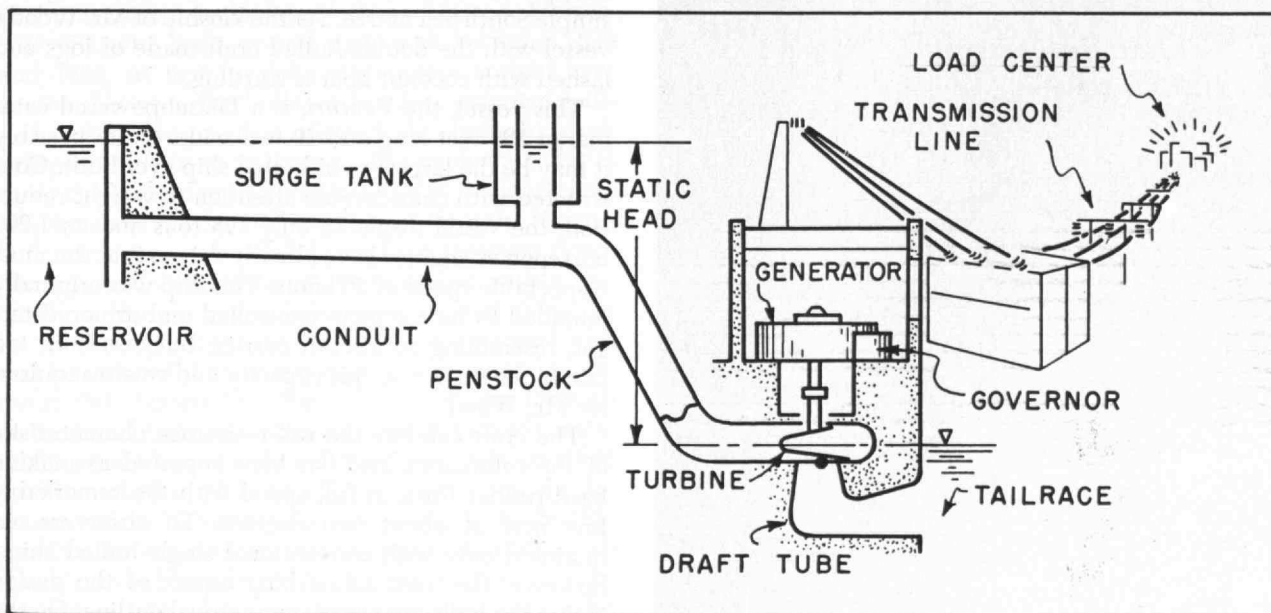
MORE efficient use of water supplies and water power, coupled with greater precision in the operation of electric clocks, may well be two of the more direct results of studies now going on at the Institute. Under a special grant from the Research Corporation of New York, the hydraulics division of the Department of Civil and Sanitary Engineering is studying the behavior of hydroelectric power systems when subjected to changes in operating conditions.

The maintenance of constant voltage and frequency of electric generating systems, although an old problem which has been studied in the past, has again assumed great importance in recent years, both because of the consumer demand for accurate electric

timing, and because of the growing practice of interconnecting several power generating systems to provide greater reliability of service. Because of the limitations of methods of analysis before World War II, earlier analyses of the transient behavior of hydroelectric systems were based on oversimplified approximations to true operating conditions. The results thus obtained are no longer good enough for operation of modern generating systems. In the present study, electronic analogue computers are employed, not only to increase the speed of calculation, but also to find solutions to problems so complicated and difficult that machine methods offer the only practical means of solving the nonlinear differential equations representing the physical structure of the system.

The general arrangement of a hydroelectric power system is illustrated in the accompanying figure. Water flows from a reservoir through a conduit and penstock to a water turbine. To damp out pressure fluctuations, which result when the water flow rate is changed, a surge tank containing a central standpipe is connected to the conduit slightly upstream from the penstock. A governor on the turbine regulates the speed of rotation by opening and closing the turbine nozzles. It is evident, therefore, that any change in operation involves the combined transient properties of the reservoir, conduit, surge tank, penstock, turbine, and governor. In addition, a complete analysis must give proper consideration to the characteristics of electrical elements; namely, the generator, voltage regulator, and transmission-distribution network. It must also take account of the load characteristics.

As a start of what is hoped will eventually be a complete analysis of the above system, Henry M. Paynter, Jr., '44, instructor, and co-workers in the Department of Civil Engineering are analyzing a system consisting of a reservoir, conduit, surge tank, and gate. The latter is merely a valve in the line which approximates the adjustable nozzles of the water turbine. The first problem up for detailed study is the behavior of surge tanks — devices incorporated in all hydroelectric systems to



Schematic diagram of a typical hydroelectric installation whose transient performance is being studied by means of electronic analogue computers.



Philip Gendreau

help eliminate changes in water pressure as gates and valves are opened and closed. Mr. Paynter plans to make a thorough analysis of such tanks, and hopes to determine a way to definitely ascertain the sizes and designs most suited to particular needs.

Of the various types of computing machines that might be used for such studies, the most suitable seem to be the electronic analogue type. Analogue computing components may be assembled to solve a part of a large problem, after which more components may be added to include additional parts of the problem until finally a machine is constructed which will solve the entire overall problem. For the hydroelectric problem, computer elements have been combined to indicate the transient conditions caused by the interaction of the reservoir, conduit, surge tank, and gate for comparison with and extension of the calculations that were carried out manually. Results from the machine are indicated by a curve which is traced on an oscilloscope. In typical examples which have been observed the fluctuations of water level in the standpipe are indicated as a function of time when the water flow is started and stopped in a given flow system.

Reliable agreement has been found between the results from the computing machine and those obtained by manual computation. Additional solutions are now being obtained with the computing machine for other types of surge tanks and for other changes in the system. More analogue components are being prepared for the next step in the expansion of the problem, which will take into account the dynamics of the governor in operation of the gate.

Something New, Something Old

GAR WOOD's *Miss Americas*, the motor boats that for many years made and remade the world's speed records, were a far cry from the ancient double-hulled sailing canoes of the South Seas. His latest venture into naval architecture also has the earmarks of the ultramodern — Diesel engines, variable pitch propellers, plywood hulls, and other features confusing to a simple South Sea native. Yet the kinship of Mr. Wood's vessel with the double-hulled craft made of logs and lashed with coconut fiber is startling.

This vessel, the *Venturi*, is a Diesel-powered catamaran 188 feet long and 40 feet wide. Quite possibly it may be the largest twin-hulled ship ever built. Constructed with considerable attention to weight reduction, the vessel displaces only 128 tons and its 1,200 horsepower engines have already driven it at the most respectable speed of 26 knots. The ship was originally intended to be a remote controlled and armored target, resembling an aircraft carrier, but was built too late to see service in this capacity and was reacquired by Mr. Wood.

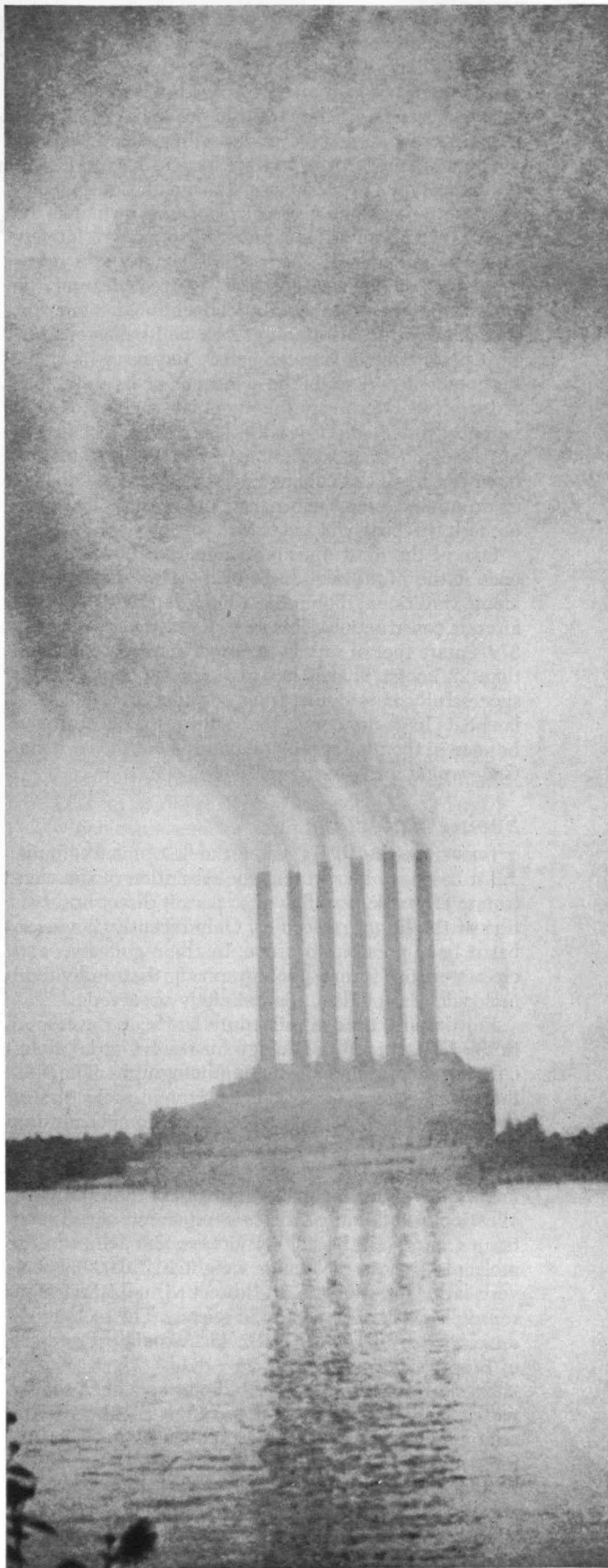
The craft exhibits the roll-resistance characteristic of the catamaran, and has been reported as making hard rudder turns at full speed with the remarkably low heel of about two degrees. To observers acquainted only with conventional single-hulled ships, however, the most astonishing aspect of the design is that the hulls are not of symmetrical outline. On the outside, each hull is straight until about a third of the

way from the stern, where it begins to curve in gently. The inside lines of the hulls are curved more or less like the outside of an orthodox boat, but in reverse. Thus the distance between the hulls at the bows is virtually the full breadth of the ship, but the hulls then belly in toward each other so that, well past the center of the ship, there are only about 24 feet between them. The area between the hulls looks like a cross section through a Venturi tube — thus the name *Venturi* originated.

Mr. Wood envisions a much larger ship of this type, weighing in the neighborhood of 16,000 tons. It would have roughly the same outside dimensions as the *Queen Mary* but could carry twice as many passengers and could be driven to perhaps 36 knots with about 120,000 horsepower. The *Queen Mary* uses 200,000 horsepower to reach some 32 knots. Offhand, it would seem that the future of the catamaran as a cargo carrier is less bright. For the same capacity it would inevitably require more hull structure and wetted area. As a passenger ship, its inherent roll stability and greater deck area are definite assets.

More traditionally, the catamaran has been known since the days of Lord Anson who circumnavigated the globe about 1740 (and who during his voyage took a Spanish treasure galleon from Acapulco that was worth 500,000 old-fashioned British pounds). Other sailors, including the New England whalers, continued to report on the astonishing speed of the asymmetrical hulls, and of their ability to lie much closer to the wind than the European ships of the period. The catamarans and outrigger canoes were built without benefit of metal fastenings or Western methods of construction and were hardly designed to impress American and European eyes with their seaworthiness. Nevertheless, it would seem that the speeds reported for these little boats — up to about 18 knots — would have made more of a stir since the fastest single-hulled ship ever built, the *James Baines*, made its record breaking 21 knots on a displacement of 2,515 tons and a length of 266 feet.

One of the few serious students of the catamaran in this country was the late Nathanael Greene Herreshoff, '70, who built several such craft between 1879 and 1885. At first he did not maintain a rigid connection between the hulls, and in fact patented ball-and-socket designs that allowed the hulls to work independently to some degree. (The tendency today is to tie the hulls together very stiffly, and to claim some aerodynamic lift from this bridge.) Captain Herreshoff used to race the Fall River Line steamers down Narragansett Bay in his catamarans, and with a stiff wind could draw away from these 16-knot ships. As far as photographs show, his hulls were symmetrical, and he either did not know about, or chose to ignore, the slightly bizarre lines that the Polynesians, through centuries of trial and error (and with hydrodynamic justification) had developed for these craft. In 1945 the Herreshoff yards built a 25-foot experimental catamaran called the *Sea Spider* to examine its production possibilities. It was not an unqualified success, although it could be driven to 15 or 16 knots. The type has not caught on as a pleasure or racing craft in this country. Perhaps one reason for antipathy toward it is



A. W. Frasse from Black Star

that it has been barred from competition with single-hulled yachts for the last 70 years. At least one triple-hulled sailing boat has been built in this country.

As presently constructed, the two hulls and connecting structure of a catamaran do not make it an inexpensive craft, and some of its sailing characteristics may come as a surprise to a yachtsman inexperienced with the type. For example, the great righting moment (or torque for a given displacement) which is the factor that permits the catamaran to carry relatively immense amounts of sail in stiff winds, is at a maximum just as the weather hull is lifted clear of the water and when the heel, by conventional standards, is scarcely worth mentioning. As a well-ballasted keel-boat heels over, it simultaneously increases its righting moment and spills the wind out of its sails, thus reducing its overturning moment. It is, therefore, inherently stable, and if it is decked over so that it cannot be flooded, it will not capsize. The catamaran, however, has a critical angle of stability and if chance or an unalert helmsman permits that angle to be exceeded, the boat will overturn.

One of the most unusual catamarans now in existence is the *Manu Kai*, built in the Hawaiian Islands along traditional Polynesian lines but with modern aircraft construction. This 40-foot craft, carrying only 370 square feet of sail, is reported to have done more than 22 knots. That it has made long ocean voyages successfully is not surprising considering what similar boats have done over the centuries. This craft can be seen in the photograph on page 584 in the *National Geographic* for November, 1949.

Seeing Molecules

EVER since the 1930's, when the first unit was built, it has been known that the resolution of the electron microscope is sufficient to permit direct observation of the larger molecules. Only recently, however, has it been possible to prove, by the regularities and characteristic forms photographed, that individual molecules can, indeed, be definitely observed.

For the first time, a procedure has been developed in the Department of Biology for resolving the molecules of the protein, edestin, in photographs. The photograph reveals groups of these protein molecules in the crystalline state and gives information concerning their size and weight. The new procedure represents another advance in the rapid development of electron microscopy, which is making possible the direct visualization of colloidal particles, components of cells and tissues, and even the smaller viruses. Since the edestin molecule (whose molecular weight is 290,000) is not very large for proteins, the direct visualization of it represents a significant step in science. The technique, developed by Cecil E. Hall, '48, Associate Professor of Biophysics, is as follows:

Edestin crystals are deposited on a specimen screen with collodion film. Since the crystals themselves are relatively opaque to the electron microscope, a "transfer shadow" is employed to render the surface structure visible. A specimen is placed in an evacuated bell jar and coated with uranium or nickel, evaporated from a hot tungsten filament placed off to one side. The uranium or nickel does not, of course, deposit uni-

formly over the surface but does so in a manner which reveals the surface irregularities. The surface is then coated with an evaporated film of silicon oxide which forms the next backing. Next, the collodion is washed off with acetone, and the residual protein with dilute hydrochloric acid, leaving a film of silicon oxide with the uranium or nickel deposit representing in relief the edestin crystal.

An attempt is now being made to extend the techniques employed in this study to obtain photographs of even smaller protein molecules.

The Story of Vermiculite

RELIABLE records indicate that the story of vermiculite began in 1824 when one of the early American scientists, Thomas H. Webb, found a sample of this mineral near Worcester, Mass. He took it home with him and tried to investigate its properties. According to the chemical knowledge of that time such an investigation consisted mainly in trying to dissolve it in various liquids and, if that did not yield any results, in calcining it.

It was the result of this calcining which led to the name of the then new mineral. "If subjected to the flame of a blowpipe, or that of a common lamp, it expands and shoots out into a variety of fanciful forms, resembling most generally small *worms* having the *vermicular motion exact*. . . . I term it Vermiculite"* This expansion, or exfoliation, as it is also called, is not only visible, it is also clearly audible, and the sound resembles a crackling brush fire except, of course, that it is much fainter. Webb seems to have been too surprised to measure the expansion exactly. It is now known that the volume of exfoliated vermiculite is about 16 times the volume before expansion takes place.

In the course of the Nineteenth Century it gradually became known that vermiculite is not really rare. Small quantities of it can be found in many places all over our planet, especially in such places as where mica occurs, since the two are somewhat related. In fact, more than one scientist began to suspect that reports of Persian and Indian magicians, who "caused stones to grow" before the eyes of their audiences, actually referred to exfoliation of vermiculite. It is easy to see why the spectacle of a stone expanding with crackling noises and weird motions would be accepted as magic by an untutored audience, especially since the same stone seemed to turn into gold or silver in the process. The material does acquire a golden sheen when exfoliated, and it is sometimes found in this state.

Vermiculite may have fooled prospectors on occasion because of its golden sheen. One can only say that anybody who thought it to be gold must have been quite untutored and inexperienced since real gold is one of the heaviest metals, while exfoliated vermiculite is lighter than cork and cannot get considerably heavier than water even when soaked with moisture. Prior to expansion, it looks black or blackish brown and resembles wood that has rotted in the ground.

(Continued on page 219)

* *American Journal of Science*, 1824, VII: 55.

Weapon of the Next War—I

The Probable Nature of Any Future War Provides Cogent Reasons

for Rapidly Building Structures for World Security. Some

Modern Instruments of Warfare Are Appraised Herewith

BY M. H. WILLIAMS

THE current publicity which is being given to the development of rockets and guided missiles, together with the atomic bomb, has resulted in much serious thought, as well as conjecture, by individuals in the Armed Forces concerning the part to be played by their respective services in any future war. One method of arriving at a logical conclusion would be to trace the development of rockets and guided missiles; but, since this is an era when a new discovery might instigate a complete technical revolution, any examination of the subject must of necessity be considered in very general terms.

Rockets are an old weapon of war. The Chinese first used them in the Thirteenth Century and they were employed by various Western nations for the following 500 years without any spectacular results. However, late in the Eighteenth Century, they were used effectively against the British by Tippoo Sahib and, as a result of this Indian success, an Englishman named William Congreve developed the war rocket to a point where it became a serious rival to the smoothbore guns of the day. In fact, every European army had a corps of rocket artillery as part of its organization during the early Nineteenth Century.

The rocket was then superseded by rifled artillery and for nearly a century it was employed principally for lifesaving, signaling, and other special chores. It was not used in a significant role again until 1940 when its return was made possible by the mastery of new engineering techniques as well as a greater appreciation of its potentialities. Ten years ago, many people, including military leaders and engineering experts, had no faith in rockets; yet today, rockets not only have already played a major part in warfare, but are challenging both artillery and aircraft, and promise to be a decisive weapon in any future conflict.

During World War II only flying-bomb types of pilotless aircraft, culminating in the famous V-1, were employed by the Germans, but future possibilities are already assured, not only in the ability of the machines to deliver explosives to a distant location, but also for reconnaissance and the destruction of enemy aircraft by collision with launched short-range projectiles. By the end of the war the Germans had, in advanced development, rockets carrying out all three of these functions, but the future pilotless aircraft will certainly be jet propelled or rocket propelled. In effect, then, the present distinction between pilotless aircraft and rockets will soon disappear.

The rocket has two dominant characteristics in its enormous rate of power generation, more than a thou-

sand times that of a conventional engine of similar size, and its independence of any external medium for fuel, support, or thrust. The first characteristic enables it to achieve very high speeds and accelerations, while the second permits it to travel in the rarefied air of the upper atmosphere, or in no air at all. The second characteristic emphasizes the fact that the rocket exerts no recoil, an important, and in some ways, an overwhelming advantage over ordinary artillery.

Some Fundamentals

The performance of a rocket depends upon certain technical considerations. The most important of these is the jet velocity which in turn depends upon the type of fuel used and the efficiency of the motor. Using the most powerful chemical fuels, this velocity has a theoretical maximum of about 12,000 miles an hour. The V-2 rocket was comparable, according to its designer, with that of the airplane at the close of World War I, as far as development was concerned. Yet the V-2, which represents an early stage in rocket development, had a jet velocity of 4,770 miles an hour.

A rocket motor with a certain performance can be used in two ways. First, it may be employed to drive the projectile or aircraft at a certain velocity which is then maintained as long as the fuel supply lasts, usually a matter of seconds or at most a very few minutes. Air resistance prevents the machine from reaching more than a fraction of its theoretical speed, and the flight or trajectory ends soon after the failure of the fuel supply. Consequently, this is a short-range, low-altitude application of the rocket in which the maximum speeds attained are usually less than the velocity of sound.

The second use, exemplified by the long-range rocket, A-4 (V-2), is for those cases in which the motor imparts the greatest possible velocity to a machine which, for most of its flight, travels as a free projectile at such a height that air resistance is almost negligible. It is by this method, and this method alone, that the rocket is used efficiently. The atmospheric applications are all extremely wasteful of fuel and are only justified by high performances which cannot be obtained in any other way. For example, in a vacuum, where its motor could still operate (although its control surfaces would, of course, be useless) the Me-163B would attain a speed of 2,700 miles an hour when it had burned up all of its fuel. In practice, however, once it has reached a velocity of about 600 miles per hour, all the remaining fuel is used to overcome drag.



Philip Gendreau, N.Y.

If air resistance is neglected, it is a relatively simple matter to design a rocket which will travel at twice the velocity of its exhaust. As far as present fuels and motors are concerned, this would mean 10,000 miles per hour. Theoretically the speed can be increased by increasing the fuel load, but such an increase in fuel will soon reach the maximum limit due to the size of the rocket, even if the entire payload is sacrificed. A rocket capable of traveling at three times the velocity of its jet would have to consist of 95 per cent fuel by weight. This obviously would not be a practical weapon.

This is only part of the story, however, for in addition to the loss due to air resistance, a rocket has to expend fuel to support itself against the force of gravity. This fuel could otherwise have been used to increase the final velocity of the rocket; so, when one considers the two losses, plus the actual velocity, the theoretical velocity is as shown below:

	Miles per Hour
Air Resistance Loss	1,000
Gravitational Loss	1,100
Actual Velocity	3,400
Theoretical Velocity	5,500

If launched from the top of a mountain, a very long-range rocket would gain considerably in velocity, for the density of air is cut in half at an altitude of four miles, and the air resistance would be lessened. Then, too, higher accelerations would be possible with a consequent reduction of gravitational loss. Obviously, this point has definite strategic implications.

The range of a rocket depends upon its velocity at the instant that its fuel is burned up, for from that moment on, it takes on the characteristics of a normal projectile. If a rocket attained a speed of five miles a second (18,000 miles per hour), it would have infinite range, inasmuch as it would never return to the earth. Such high speeds are, however, unnecessary, for science has proven that the range of a rocket can be increased greatly by the use of wings which come into

play at the end of the free trajectory and enable the rocket to enter a high-speed glide. The German A-9 was to have an 800-mile trajectory (as an upper step of the A-10), after which it entered its glide at 8,000 miles per hour and so achieved a total range of 3,000 miles. Speeds of four miles per second (14,400 miles per hour) would suffice for the greatest possible terrestrial ranges, and such speeds can be obtained by step rockets, launched from high altitudes.

Rockets Applied to Warfare

Rockets of the short-range class have already played an important role in war, particularly when they were used by aircraft for ship and ground attack. They produce no recoil and require only very light launching equipment. Therefore, a large number of projectors may be concentrated in one spot, lay down a short-range barrage of an intensity impossible to secure by other means, and then be quickly moved to a new location. Examples of this employment included the "Katushka" rocket barrages of the Russians at Stalingrad, and later uses by our own forces in attacks or amphibious landings. In this method of employment, the short range and inaccuracy of the weapon are not too important, for area coverage is desirable, and if barrages are ever used in future wars they probably will be provided by rockets rather than by the standard types of artillery.

The lack of recoil has made possible the design of weapons with great fire power which can be operated by a very small crew or even by a single man. The bazooka is an example and it may have marked the beginning of the end for tank warfare. A few infantrymen equipped with the latest improved rocket weapon can now destroy the largest tank, and one must bear in mind that while the bazooka is only in the beginning of its development stages, the amount of armor plate that a tank can carry appears to be approaching its limit.

The rocket mine appears to have great possibilities as a particularly effective antitank weapon with the invention of a short launching platform buried vertically in the ground and, although more difficult to install than a normal antitank mine, would be much more effective against armored vehicles.

Air-borne rockets have already radically affected aircraft fire power and there is no reason to believe that the progress will not continue. For example, the largest gun installed in an airplane so far was the 75 millimeter. It weighed 760 pounds and fired a 15-pound shell containing only 1.5 pounds of high explosive. Suppose that this 760-pound gun was replaced by 12 rockets weighing 60 pounds each. Such a replacement would not only provide for greater destructive power but also would not reduce the airplane's performance by the dead weight of the gun. Authorities have admitted that the fire power of a rocket-carrying fighter equals that of a six-inch gun cruiser, and there is no limit to the size of projectile as long as the airplane can lift it off the ground. Airplanes fitted with such weapons may well have the capability of preventing the movement of armored units unless the latter are protected by air cover.

(Continued on page 220)

Living in an Atom-Bomb World

What We Have Most to Fear Is Not Any New Means of Destruction, but Simply Ourselves. The Atom Bomb

Is Just Another Instrument of Mass Destruction

BY M. F. ASHLEY MONTAGU

GENERALLY unknown is the fact that when the atom bomb was put together by those scientists who made it, they unanimously agreed to petition the President of the United States not to use it as a destructive weapon. They strongly urged that the Japanese Government should be informed of its existence and that the United States Government would be willing to release it over any uninhabited Japanese territory specified by the Japanese Government. For reasons best known to himself, the President declined to act upon this suggestion, and the world witnessed the spectacle of a civilized nation taking upon itself the moral responsibility of destroying two Japanese cities, and killing and maiming several hundred thousand human beings.

That any other nation would have done the same may, or may not, be true. Certainly no nation that has been Westernized to an appreciable extent would have desisted. Western man has become so calloused to the meaning of life that he has virtually lost respect for it. Some men even talk of wars less intelligently than they do of the common cold. To avoid the latter, they will take some precautions; but to avoid the former, they do nothing. They blandly believe that wars are inevitable, that wars are as natural as fighting between animals, that the impulse to make war is in-born, and that there is nothing to be done about it. Nothing could be further from the truth. Wars are fought for artificial reasons and arise from artificial causes. They are fought with artificial devices, and they are as stupid as they are unnatural.

Man is, by nature, a peace-loving creature. It is through education, by the processes which are borne in upon him in the course of his transformation into a human being, that he becomes aggressive and sympathetic to any and all belligerent invitations which are extended to him. The Eskimos do not understand the meaning of war; neither do the Australian aborigines; nor do the nonliterate peoples of Siberia—the Chuckchi, the Yokut. All of these peoples are characterized by cultures in which the idea of war is nonexistent. War is simply *not* one of the ways in which these people solve problems which Western nations are accustomed to put to the arbitrament of war.

If we do not solve the problem of the atom bomb, these people might well survive us. The atom bomb will not see the end of the human species. We can be quite sure about that. But do we want the atom bomb to be the end of our civilization? Of ourselves? Of our posterity? It is not sensible to answer, "We do not," for

what we wish, and hope, and believe is not what we say, but what we do. If we are to evaluate the answer in terms of what we do, rather than what we say, the logical conclusion is that we do wish to see the end of ourselves, and of our children and their children.

Most people have been frightened by the atom bomb; it might be dropped on them. They are not, however, averse to dropping it on others. As long as people continue to think and act in that way, there can be no hope whatever that we shall be spared the treatment we accord to others.

What we have most to fear is not any new means of destruction, but simply ourselves. The atom bomb is just another instrument of mass destruction. We, who created it, can outlaw it, or at least we could so long as we were the sole possessor. But that will do us little good until it is possible to outlaw that thinking which makes it possible to use such destructive instruments against our fellow men. So long as anyone maintains overt or covert hostility toward human beings because they are in some way different, war and destructive weapons will be employed.

So long as we continue to think that we are in competition with other human beings, we shall continue to compete with them. Friendly competition may act as a spur or stimulant, but hostile competition too often leads to the use of force. So believing in the use of force, we shall segregate potential competitors whenever we can, so that they may be handicapped in the race with us.

A Living Brotherhood

Mouthing beautiful Christian sentiments about loving others as ourselves and of brotherly love, we shall discriminate against others because they are of another skin color, or religion, or culture, or nation. We shall oppress, coerce and exploit, fear and hate, and these things shall become so habitual to us that we shall scarcely, if ever, be aware of our crimes against our fellows. To prevent the danger of becoming conscious of such things, we shall build up a system of rationalization about the inferiorities of other peoples and convert our prejudices into laws of nature, which have but to be taken for granted to be lived with a more or less easy conscience. So to live is to live ever nearer the brink of inevitable disaster. There is only one thing that can save us, and that is to stop talking about brotherhood and to live it.

"No man is an *Iland*, intire of it selfe; every man is a peece of the *Continent*, a part of the *maine*; if a *Clod*

bee washed away by the Sea, *Europe* is the lesse, as well as if a *Promontorie* were, as well as if a *Mannor* of thy friends or of thine owne were; any mans death diminishes me, because I am involved in *Mankinde*; And therefore never send to know for whom the bell tolls; It tolls for thee."

Written in 1624, John Donne's beautiful words express the eternal truth by which men must live if they are ever to live happily together. Whether anyone likes it or not, one world is today already a functional reality. The voice of man can travel to any part of the earth within a fraction of a second. Communication on the physical plane is now possible between all the peoples of the earth, and most human beings want to communicate with us, not only physically, but socially. They want us to be as actively interested in them as human beings as they are interested in us. They want to learn from us, and they want us to help them, as many of them have taught and helped us.

To us, who are so sophisticated, the nonliterate peoples appear as humble and rather undeveloped members of the human family. Yet, humble and technologically undeveloped as they may be, they are often the bearers of spiritual riches and ways of life from which we could both learn and gain much.

We of the Western world have been too vain and egotistical, too prideful and patronizing to notice the riches which those, whom we had condemned to an inferior status, had to offer. We have already brought the atom bomb to the peace-loving people of the Bikini atoll. We have made their immemorial home uninhabitable, and not one of us protested against this outrage. We believed that the atom bomb had to be tested, and we blandly consented. The people of Bikini had solved the problem of living together. We haven't. The problem of living in the modern world will have to be solved by the peoples of the Western world — the peoples, in effect, who created the atom bomb.

As James F. Byrnes, former Secretary of State, has put it: "We live in one world, and in this atomic age regional isolationism is even more dangerous than is national isolationism. . . . Today the world must take its choice. There must be one world for all of us or there will be no world for any of us."

Indeed, as the Federation of American Scientists has declared, no nation can, in this new age, feel secure until the problem of the control of atomic power is solved on a world level. That solution can only be a moral and political one. It is a solution which cannot come from one people, one nation, but must come from all peoples, all nations; and, the solution can and must come in the same manner as the bomb was created, that is, by co-operation between nations. It was the work of Mendelyeev, a Russian; of Thompson, Rutherford, and Chadwick, Englishmen; Einstein and Hahn, Germans; Bohr, Norwegian; Meitner, Austrian; the Curies and Joliot-Curies, Poles and Frenchmen and women; Fermi, Italian; Anderson, American; and Yukawa, Japanese, which made the atom bomb possible.

By putting together the ideas developed, and the discoveries made, by all these scientists, the atom bomb was produced. Why can't we put the ideas and discoveries for the maintenance of man's life in peace

and universal amity to work in the same way? The answer is that we can and must. Another war will mean the suicide of Western man. The destiny of Western man is being decided now, at this moment, by each and every one of us. Each of us, as a citizen, is a possessor of great potential power. Each of us can play a most important part in seeing to it that the the right decision is made about the atom bomb.

It should have been obvious all along that atomic "secrets" could not be kept for more than a few years by any nation or small group of nations, and that there can be no assurance that peace will be maintained as long as any nation has the sovereign right to decide questions of war and peace for itself. Peace is not merely the absence of war but the presence of justice, law, order — in short, of government.

A World Law

World peace can be created and maintained only under world law, universal and strong enough to establish justice and prevent armed conflict between nations. The only way by which a people can assure its survival and preserve its liberties is to unite with other peoples for the creation of a world government to which shall be delegated the powers necessary to maintain the general peace of the world based on law and justice.

As now constituted, the United Nations is a league of sovereign states bound together by treaty, not by world law. As such, it is not a world government and, therefore, cannot by law prevent armed conflict between nations and establish justice and security. Nevertheless, it is the greatest step yet taken by mankind toward world peace. Since the charter provides for amendments, every effort should be made to transform the United Nations into a world government.

Such objectives cannot be reached overnight; but, despite all difficulties, these objectives can, nay must, be accomplished. We must help build support for world government, and we must start now. The time is short. We must convince our friends, and get them to convince theirs, of the urgency and manner in which they may work to make world government a reality. In the first place, we must become clearly aware of the issues involved, and these may be summarized as follows:

- (a) There is absolutely no defense against the atom bomb.
- (b) No system of inspection could prevent its secret manufacture.
- (c) No law-enforcing authority could prevent its secret manufacture.

It is only by the creation of a concert of nations, all of whom will work in harmony with one another in a common world government, that any nation can be assured against the use of the atom bomb. To this end, therefore, it should be sought to introduce the following proposals to the United Nations:

1. That the United Nations be transformed from a league of sovereign states into a government deriving its specific powers from the peoples of the world;

(Continued on page 228)

The Delayed Invention

*An Idea Endorsed by Hundreds of Engineers Has Never
Been — and Possibly Never May Be — Built.*

So Arises the Question, "Why Not?"

BY WILLY LEY

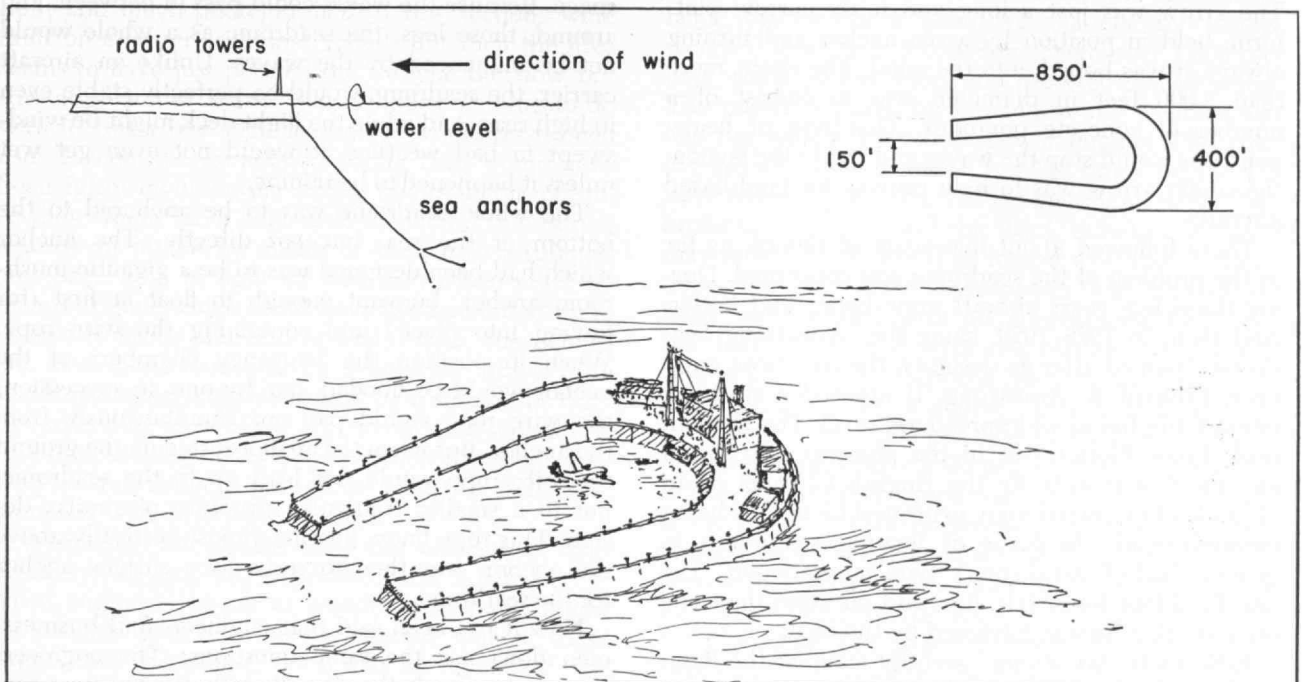
HISTORICALLY the next 10 years may still prove me wrong about the theme of this article. If so, I'll be delighted. But if history doesn't prove me wrong, chroniclers of 2050 A.D. will write that there was a marvelous invention around during the first half of the Twentieth Century, but that this invention was not realized because there was no need for it. Or rather, yes, there was a need for it but it was not built because it wasn't quite practical. No, to be precise, it *was* practical and there *was* need for it, but the necessary capital was lacking. Even that isn't quite correct. Capital was available and would have been — oh, well, the invention just didn't happen to come off. I am speaking about the idea of the floating airport or seadrome, an artificial landing place for aircraft, discussed in numberless articles and made into a movie called *FP-1 Doesn't Answer*.

The idea originated very soon after World War I. The war had ended and international commerce could start over again. The most important single international traffic and tourist lane was the London-New York run. The existing large ocean liners which had survived the war were more or less obsolescent. Airplanes, on the other hand, had ceased to be merely experimental. It would be nice to open a transatlantic

air line, but the drawback was that airplanes could not yet fly the Atlantic. If only there were a few islands in the proper places, and at the proper distances from each other.

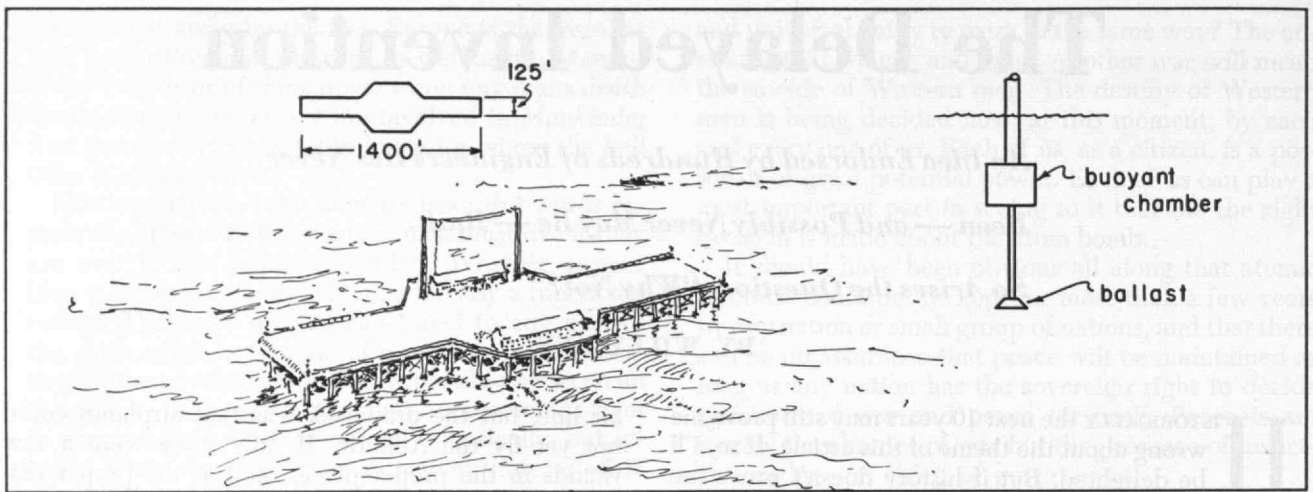
At that point somebody thought of a solution: why not build such islands? No real islands, of course; that would be impossible in a depth of water of never less than a mile and usually around two miles. But floating islands, places where an airplane could land and re-fuel, or wait out a period of bad weather, were possible. Partly because the Swiss-German firm of Dornier had just started building a successful line of flying boats at that time, and partly because ocean flying loomed important at the time, the first design for such a floating seadrome was tailored to fit the needs of flying boats.

It was to be a horseshoe-shaped steel structure, clad with thin armor plate, about 850 feet long and 400 feet across at the widest part. Such a structure, secured in position by sea anchors reaching down into layers of the ocean where there are neither waves nor currents, would always head into the wind and would create a large and quiet lagoon for flying boats and pontoon airplanes. The two "legs" of the horseshoe could also serve as runways for smaller



Among the earliest designs of seadromes to facilitate transoceanic flying was the type of floating island pictured above, providing a lagoon for flying boats and pontoon airplanes, and runways for smaller craft.

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airplanes. There were to be a repair shop, a few hangars, a radio station, a hotel, and even two ocean-going tugs to tow in flying boats which might have made emergency landings. It made exciting and impressive pictures and while there was no doubt about the usefulness of such structures, naval engineers began to wonder about the problem of building one.

A more or less solid horseshoe of such size would be endangered by wave action. It would have to be both rigid and flexible at the same time. There was virtually no experience with such a design. And it would cost a lot of cash, especially since one such seadrome would be of little use; about half a dozen were needed for the aircraft of that time.

After some discussion the design was quietly filed away, pending improved aircraft on the one hand, and a better seadrome design on the other. Nor did an attempt at saving the idea do much good. That attempt consisted in preserving the feature of the quiet lagoon without subjecting the seadrome itself to wave-action stresses. It was "an arrow in a circle." The arrow was just a long and fairly narrow platform, held in position by a sea anchor and turning always, it was hoped, into the wind. The circle, more than 2,000 feet in diameter, was to consist of a number of concrete pontoons. That ring of heavy pontoons would stop the waves and create the lagoon; the center arrow was to be a runway for land-based aircraft.

There followed about five years of silence, as far as the problem of the seadrome was concerned. During those five years aircraft grew better and better. And then, in 1928-1929, came the "Armstrong Seadrome," named after its designer, the American engineer, Edward R. Armstrong. It aroused a storm of interest and found widespread approval. The Frenchman, Louis Blériot, one of the pioneers of aviation and the first man to fly the English Channel in an airplane of his own design, expressed himself as being enthusiastically in favor of floating seadromes in general and of Armstrong's type in particular. The late President Roosevelt, too, said on more than one occasion that he was intrigued by the idea.

Edward R. Armstrong carefully avoided the flaws of the earlier suggestions. His proposal is so impressive because it is truly a "design"—a plan that has been worked over, and through, from top to bottom

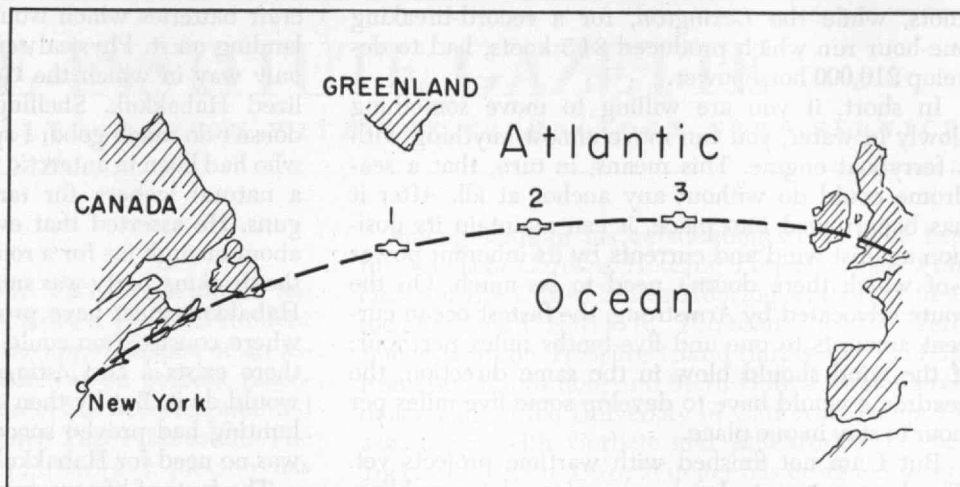
by a number of engineers. In fact, other engineering firms were called in for detail, such as the design and construction of the anchor for the whole structure. Reflecting advances made in aviation in the meantime, the Armstrong seadrome was designed for land-based aircraft. It was essentially a gigantic platform, 1,400 feet long and over 350 feet wide, raised 100 feet above the surface of the ocean—30 feet higher than the highest wave ever recorded. The platform, of course, corresponded to a whole floor, and underneath the flight deck there would be hangars, repair shops, kitchens, laundries, dining and recreation rooms, crew quarters, and hotel rooms; in short, a complete airport and a hotel were to be included in the structure.

The platform was to stand on a large number of hollow "legs," reaching down into the water and then widening out into buoyant chambers below the level of wave activity. Naturally the buoyant chambers were to be accessible through the legs themselves and some of them could be used as storage space. Because the waves could pass in between, and around, those legs, the seadrome as a whole would not be influenced by the waves. Unlike an aircraft carrier, the seadrome would be perfectly stable even in high seas. And while the flight deck might be windswept in bad weather, it would not even get wet unless it happened to be raining.

The whole seadrome was to be anchored to the bottom of the sea, but not directly. The anchor which had been designed was to be a gigantic mushroom anchor, buoyant enough to float at first (for towing into place) and containing the wire rope. When in position the buoyancy chambers of the anchor would be flooded, one by one, in succession; the wire rope would pay out simultaneously from the anchor. But when the anchor rested on the ground the wire rope would not lead up to the seadrome, but to a smaller triangular structure of similar design. This rope buoy, floating almost vertically above the anchor, was then to serve as a surface anchor for the seadrome.

Now it has been said that engineers and businessmen don't ask the same questions: The engineers want to know whether it will work; the businessmen, whether it will pay. The engineers needed little convincing as far as the Armstrong seadrome was con-

Almost a quarter century ago, Edward R. Armstrong proposed the type of seadrome shown on the opposite page. To make transatlantic flying safe, three such seadromes were to be anchored along a great circle route from New York to London, as shown in the map at the right. The Armstrong seadrome was designed to have its landing platform well protected against even the largest waves.



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cerned. One could ask for more specific information on specific points, but it was clear from the outset that the seadrome would be able to do what it was supposed to do. The waves would hardly influence it, the anchor had only to hold it against wind and current, and Armstrong had all the figures ready. The businessmen were somewhat harder to convince. It was possible to figure the probable construction costs for three such seadromes. (It has to be mentioned here that maximum economy was likely to result from three such stopover points: Less than three would not increase the pay load enough; more than three would cost too much.) But when it came to figuring airplane pay loads and so on, a specific type of airplane had to be assumed. Among my papers of several years ago there are cost calculations based on the then new DC-3, and one cannot help but smile at these figures now. Who would have the courage to cross the Atlantic in a DC-3 of that vintage?

Still, the project made fast progress for a while. A scale model (one 32d of an inch to the inch) was built and much photographed. A few sections were built on a larger scale and tested. But then the idea seems to have just petered out. Maybe the slow but sure approach of World War II had something to do with it. But a few such seadromes would have been useful when the war actually came. They would have been fairly invulnerable strong points in the ocean, as they would have been able to defend themselves against air attack by means of their own airplanes, and been able to fight off smaller surface craft by means of guns which could have been mounted there (a steady firing platform at sea!). Also, they could not have been damaged by submarine attack. The seadrome could have been sunk by a submarine only by torpedoing most of the legs on one side separately. In short, nothing could have touched it, except possibly a full-fledged battleship like the *Bismarck*, mounted with heavy naval rifles.

When the war really came the absence of seadromes was generally regretted, and a number of naval engineers began to wonder whether it might be possible to create one in a hurry. One of these suggestions was simple, but it may be significant that Navy authorities permitted it to be published while the war was going on. On the other hand, it would not have helped the Germans much to know about

it, because except for sabotage in the dockyard there would have been little they could have done about it. It was simply a very large compartmented concrete "brick" (with 10-foot thick outer walls) which measured 1,500 feet long, 500 feet wide, and 120 feet thick. Inside, it was to be compartmented into 750 watertight cubbyholes (each considerably bigger than a large living room) by means of re-enforced concrete walls a foot thick. Considering that the average waves of an Atlantic storm are almost never higher than 10 feet, it was planned that this brick would float with its topside 40 feet above sea level.

In spite of the enormous size of this brick, it could have been towed into place without too much trouble. Even a very large mass can be moved by comparatively small tugboats provided that fast movement is not a prerequisite. Since this is an important point with regard to any kind of seadrome, let us consider a few figures.

In the 1930's, large log rafts were towed along the Pacific Coast from Seattle to San Diego. These rafts, held together in a primitive manner by chains, weighed more than 15,000 tons, were over 1,000 feet long, some 60 feet wide, and drew 26 feet of water. The power required for moving in any weather was one tug with a 1,000-horsepower engine! This towing job was not done once, but 118 times. Of the 118 rafts which left Seattle, 115 reached San Diego. Two broke up en route, and the third, unbelievable as it may seem, caught fire. The reason why this could be done with only 1,000 horsepower was that everybody was satisfied with an approximate five miles per hour. Marine experts can explain with a few simple figures what happens (they do have the complete formulas, too, of course) and these figures say that between one mile per hour and about nine miles per hour approximately 90 per cent of the resistance is just skin friction which increases with the square of the speed. If 1,000 horsepower will tow something at three miles per hour, 4,000 horsepower would be needed if you want six miles per hour. But above nine miles per hour the wave action enters into the equation, and the power required becomes as the cube of the speed up to about 14 miles per hour. And above 14 miles per hour the power required is as the fourth power of the speed. This explains why the *Queen Elizabeth* needs 80,000 horsepower for 24

knots, while the *Lexington*, for a record-breaking one-hour run which produced 34.5 knots, had to develop 210,000 horsepower.

In short, if you are willing to move something slowly in water, you can move almost anything with a ferryboat engine. This means, in turn, that a seadrome could do without any anchor at all. After it has been towed into place, it can maintain its position against wind and currents by its inherent power—of which there doesn't need to be much. On the route advocated by Armstrong, the fastest ocean current amounts to one and five-tenths miles per hour; if the wind should blow in the same direction, the seadrome would have to develop some five miles per hour to stay in one place.

But I am not finished with wartime projects yet. The large concrete brick was released for publication, but another one was acted upon, and kept so secret that it created a big surprise to everyone when it was published after World War II. At least 8,000 Navy officers of assorted ranks swore that this was a hoax, because, if it were true, "I would have known about it." But "Project Habakkuk," as it was known at the time, wasn't a hoax.

Habakkuk was, or would have been if built, an artificial iceberg, some 2,000 feet long, 300 feet wide, and 200 feet deep. It would have been a tenuous structure if lifted out of the water, consisting of bigger girders holding smaller girders and the smaller girders, in turn, holding piping and refrigeration elements. If dipped into cold Canadian water with the power on, all the empty spaces would have filled up with nice solid ice. Once frozen, it would have been very resistant against melting even in warmer waters; the refrigeration elements could have kept it solid without much fuel expenditure.

Built in the general shape of a ship, Habakkuk was to have a large, flat flight deck for airplanes and lots of antiaircraft batteries scattered over its front section. (I feel hesitant to use nautical terms when it comes to an iceberg.) Six engine nacelles were to stick out from its sides, providing power of movement on the order of five to six miles per hour. The airplanes on the flight deck were to be submarine-hunting attack bombers; they were not meant to defend Habakkuk. The defense was up to the antiair-

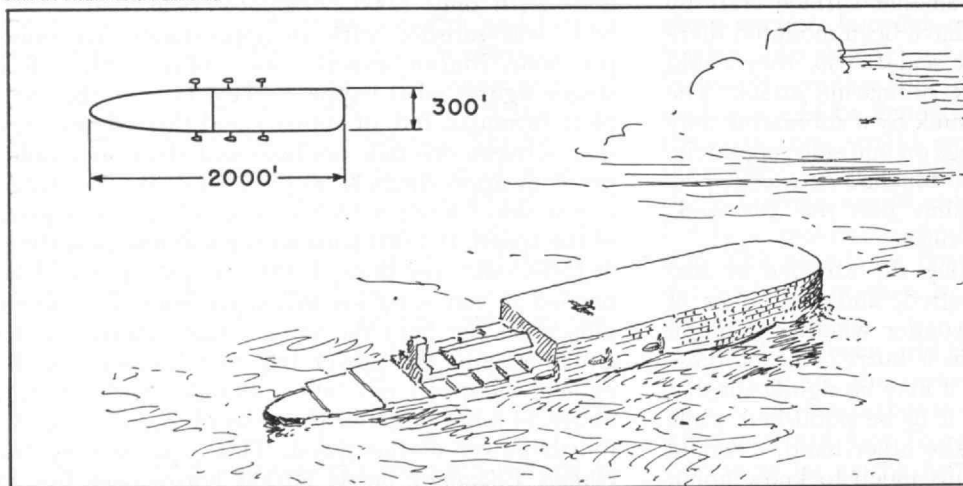
craft batteries which would fight off any attempt of landing on it. Physical seizure would have been the only way in which the Germans could have neutralized Habakkuk. Shelling or bombing an iceberg doesn't do much good; I spoke to a Navy commander who had been in antarctic waters where they had used a natural iceberg for target practice with six-inch guns. He asserted that every six inches knocked off about enough ice for a round of drinks, provided that the drinking party was small. The studies made about Habakkuk must have progressed to about the point where construction could have been started because there exists a cost estimate saying that \$70,000,000 would do it. But by then other methods of submarine hunting had proved successful enough so that there was no need for Habakkuk to materialize.

The facts of life are, as of 1950, that no seadrome of any description exists. At the same time several transatlantic air lines are going full blast, refuting Blériot's statement that the purpose of a seadrome is not to make transatlantic flying possible, but to make it profitable. The transatlantic lines, in fact, seem to operate with less red ink than the others. Just to get an idea about pay loads, fuel reserves, and so on, I queried an air line which operated the same type of airplane (DC-4 at that time) on the New York-London run (with two stops at Newfoundland and Ireland) and on the New York-Los Angeles run. The latter makes more stops (Washington, D.C.; Nashville, Tenn.; Little Rock, Ark.; Fort Worth, Texas; and El Paso, Texas) but the figures for fuel and pay load read almost the same in both cases.

All of which means that the air lines don't need seadromes. Whether a seadrome would pay, if operated essentially as a novel kind of resort hotel with some incidental air-line patronage, is a different question. Military considerations are another and very different question. Recently the Coast Guard brought up still another point of view. The Coast Guard operates units similar to meteorological stations at sea and uses its ships for the purpose. To maintain one such "station" the Coast Guard needs three vessels with a crew of 120 officers and men each. A small seadrome, estimated to cost \$6,000,000, could operate with a crew of 80 officers and men and

(Concluded on page 230)

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During World War II, a floating "brick" of re-enforced concrete was proposed as a means of quickly establishing transatlantic seadromes.

The most startling of all seadrome projects was the artificial iceberg shown here for use in Arctic regions. It was 200 feet high overall, and consisted of pipes and refrigerating elements in a structure generally resembling a ship. It might have been built at a cost of \$70,000,000.

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

On the Lot

AMONG recent changes in Faculty personnel announced by James R. Killian, Jr., '26, President of the Institute, are the appointments of an assistant professor and an assistant on student placement. In addition, Dard Hunter has been reappointed as head of the Dard Hunter Paper Museum. The present assistant crew coach, Charles O. Jackson, has been named assistant on Student Placement.

Thomas H. Pigford, '48, has been appointed assistant professor of chemical engineering and director of the Oak Ridge Engineering Practice School, effective on February 1. Following his graduation from the Georgia School of Technology in 1943, Professor Pigford served in the United States Navy as technical electronics officer. He became an assistant in the Department of Chemical Engineering at M.I.T. in 1943, an instructor in 1947, and in the same year became assistant director of the Parlin Station. He held the Humble Oil and Refining Company fellowship in chemistry during 1948.

Dard Hunter, whose retirement as curator of the Dard Hunter Paper Museum took effect last June, has been reappointed as honorary curator. As soon as the necessary construction work can be completed, the Dard Hunter Paper Museum will be moved from its present location in the Rogers Building to new quarters in the Charles Hayden Memorial Library. The new location, in close proximity to other facilities for study in the graphic arts, music, and other phases of the humanities, will enable Dr. Hunter, outstanding authority on hand papermaking processes, to extend the services and facilities of one of the most instructive and interesting of the several museums maintained at the Institute.

Also announced were the supplementary appointments of Professor John R. Markham, '18, of the Department of Aeronautical Engineering, to be director of the Naval Supersonic Laboratory at M.I.T.; and George B. Thomas, Jr., Assistant Professor of Mathematics, to be executive officer in the Department of Mathematics, effective on February 1.

Dean of Architecture Resigns

THE resignation of William W. Wurster as Dean of Architecture and Planning in the School of Architecture, effective early in 1950, has been announced by President Killian.

Dean Wurster, who has been at M.I.T. since 1944, will return to California to continue active practice with the architectural firm of Wurster, Bernardi and Emmons in San Francisco. He will also serve as dean of the School of Architecture and professor of architecture on the Berkeley campus of the University of California.

Among some of his outstanding works have been the Valencia Gardens Housing Project in San Francisco for the United States Housing Authority, in association with Harry A. Thomsen, Jr.; the Yerba Buena Club on Treasure Island during the 1939 San Francisco Exposition; and Stern Hall, a women's residence hall on the University of California campus in association with Corbett and MacMurray of New York. In addition, Dean Wurster has designed several hundred homes in the San Francisco Bay region.

For Industrial Research

INDUSTRIAL grants-in-aid totaling \$1,150,000 have been made to the Institute in recent months. In making this announcement, President Killian stated that the grants included \$250,000 each from the United Fruit Company of Boston, the Cities Service Research and Development Company of New York, the Standard Oil Company of California, and Socony-Vacuum Laboratories, a division of Socony-Vacuum Oil Company, Inc. of New York; and \$50,000 each from the A. O. Smith Corporation of Milwaukee, the Phelps Dodge Corporation of New York, and from an unnamed Massachusetts corporation. All of these grants assist M.I.T.'s current \$20,000,000 Development Program of education.

The United Fruit Company's grant is earmarked for investment with endowment and other funds. Income from this grant is to be allocated each year to fields jointly selected by the United Fruit Company and by the Institute.

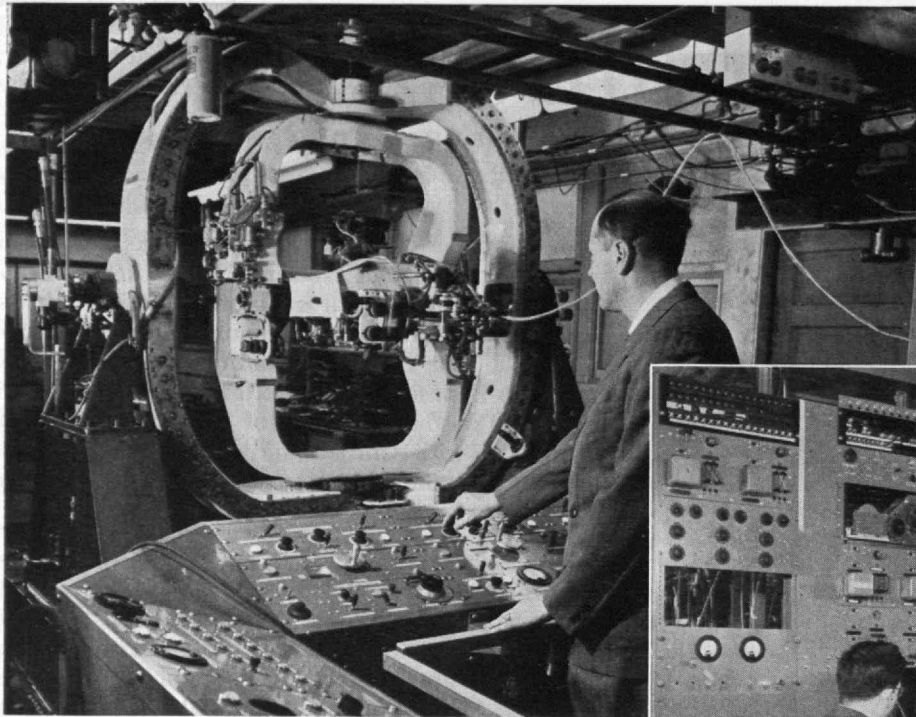
The grant of the Cities Service Research and Development Company is to be applied to research and development work in the fields of nuclear physics and chemistry, mechanical engineering, and chemistry and chemical engineering.

A substantial part of the grant from the Standard Oil Company of California is to be applied to chemical engineering and chemistry, nuclear science and engineering, and research projects in lubrication, friction, and wear and corrosion.

The Socony-Vacuum grant is to be used for both education and research in such fields as nuclear power, combustion, heat transfer, spectrochemical analysis, lubrication, corrosion, and friction and wear. The grant is payable annually in the sum of \$50,000 over a period of five years.

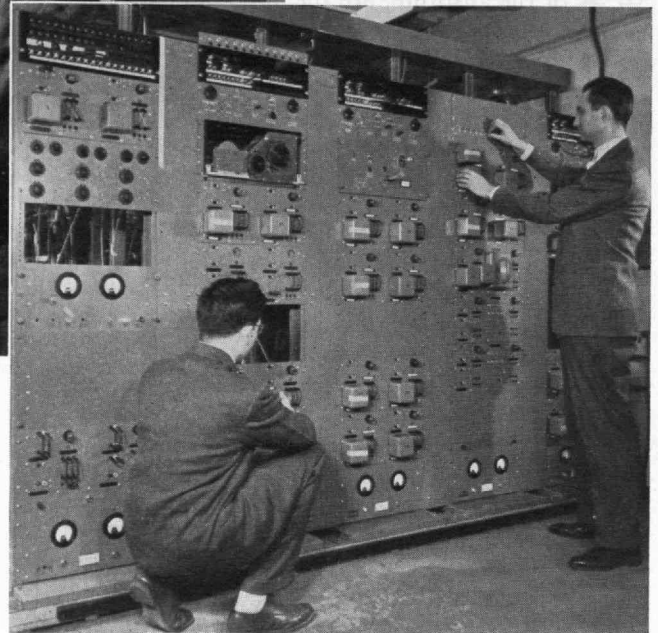
The grant from the A. O. Smith Corporation is to be applied to fundamental research in the Institute's extensive metals-processing program. The total grant is payable at the rate of \$10,000 per year for the next five years.

The Phelps Dodge Corporation grant-in-aid was made to help fulfill the M.I.T. program of preparing men equipped with a sound knowledge of recent developments in metallurgy and metal fabrication.



M.I.T. Photos

Left: The flight simulator at the Institute is operated from the control panel at which Albert C. Hall, '37, Associate Professor of Electrical Engineering and Director of the Dynamic Analysis and Control Laboratory, stands. The gimbal frame responds to the various commands given from this board to the theoretical aircraft whose characteristics have been given to the machine. Below: Engineers set up certain characteristics of an aircraft for a flight performance check.



Predicting Flight Performance

OPERATING at the Institute is a new machine designed to check flight characteristics and control equipment of an aircraft prior to construction of the craft. On this elaborate and sensitive calculator, known as the flight simulator, engineers will be able to set up an electrical model of any aircraft which is in an advanced stage of design, and then apply an actual autopilot to fly this nonexistent, theoretical craft.

The autopilot, which may be the "muscle" of either a guiding mechanism for a guided missile, or an automatic pilot for a more conventional airplane, then has exactly the same problem that it would have in the actual flight of the missile or airplane were the prototype built. Thus, the simulator is able to conduct a test flight of an aircraft in the design stage; it is designed to simulate those conditions under which an aircraft can operate.

A combination of intricate electronic and mechanical equipment, the flight simulator represents the results of a co-operative project involving more than 50 engineers and nearly three years' work. It was built under the auspices of the United States Navy Bureau of Ordnance in the M.I.T. Dynamic Analysis and Control Laboratory, of which Albert C. Hall, '37, Associate Professor of Electrical Engineering, is director.

Because it enables engineers to study some of the flight characteristics of any given design before construction is begun, the simulator can save much of the cost and time of flight testing and should help in improving aircraft design. It requires only flight characteristics obtained from working plans and carefully measured data from wind-tunnel tests of a model of the proposed craft. If, for instance, aircraft performance on the flight simulator is not satisfactory, the wing and tail designs of the electrical model may be changed by simple adjustments of the simulator controls until the desired behavior is obtained. Suitable

changes can then be incorporated in the plans before the actual airplane is built.

Thus, in an age when airplanes are called upon to fly faster and farther, this machine is expected to save valuable development time by making available, prior to construction, much information hitherto obtained through experimental flights.

"The fundamental purpose of this machine," Dr. Hall explained, "is to permit the development of high-speed aircraft with a reduction in the time, expense, and number of conventional flight tests."

The flight simulator involves the use of intricate computing machines and a flight table on which actual problems relating to flight stability are worked out. The table is an arrangement of gimbals, delicately suspended so that they can incline freely in any direction and supported on an independent foundation so that there will be no vibration.

The gimbal frame, which is operated by very high-speed hydraulic servomechanisms (automatic controlling instruments which carry out motions in accordance with electrically transmitted commands) is used to orient the automatic control system of an airplane or missile just as it would be tested in actual flight. The gimbal frame table rolls, pitches, and goes through all the motions the airplane would make in the air under stated conditions. Although the motions of the gimbal frame table, and thus the actions of the hypothetical airplane or rocket in flight, are recorded on charts, the visual study of the gyrations is of high-

est consequence, too. This is an important way of gaining information, and these visual findings of the engineer can later be checked with the mathematical record.

A problem is worked out on the apparatus by setting electronic computer dials that represent the various important characteristics of the aircraft to be studied — weight, velocity, altitude, wing span, and many others. Before the simulator can be used, many of these characteristics must be obtained from wind-tunnel tests of small models of the proposed aircraft. Then the question is fed into the simulator by applying appropriate electrical signals through a control board. The answer is returned on a chart on a recording apparatus in a matter of seconds.

This computer, one of several types of such high-speed mathematical machines at M.I.T., adds, multiplies, integrates, and subtracts at almost unbelievable speed. For example, a computation which would take an able operator 100 hours to carry out by hand is handled by the computer in 10 seconds, and much more elaborate problems can also be handled in a matter of only minutes.

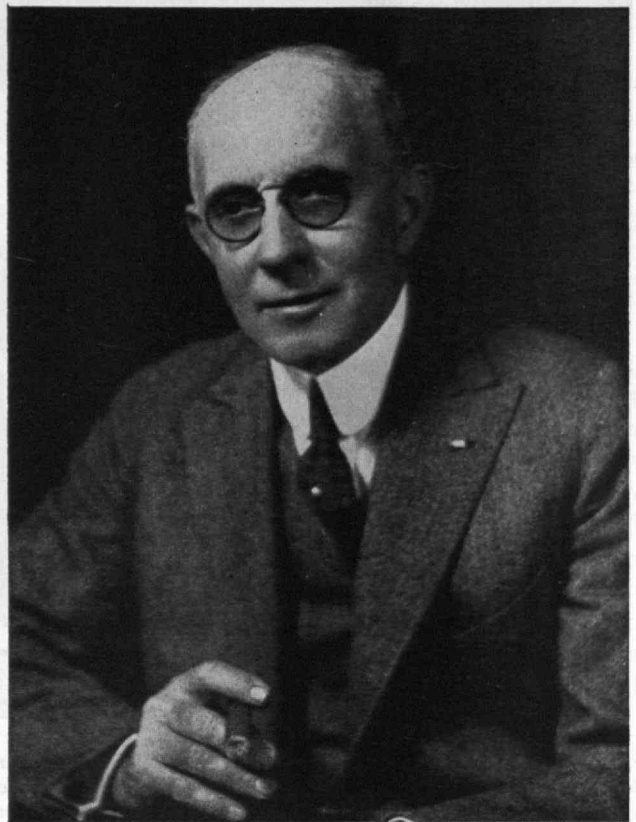
Among the M.I.T. scientists contributing to the result, John F. Blackburn, of the Division of Industrial Cooperation, developed the automatic controls and supervised the mechanical design of the gimbal frame; Emery St. George, Jr., '43, of the Division of Industrial Cooperation, developed instruments and electronic components; Charles M. Edwards, '40, also of the Division of Industrial Cooperation, designed and developed the electrical computer; and Thomas F. Jones, Jr., '40, Assistant Professor of Electrical Engineering, was in charge of simulator operation.

Frank B. Jewett: 1879–1949

FRANK B. JEWETT, '03, life member of the M.I.T. Corporation, died in Summit, N.J., on November 18, 1949, after a brief illness. He was a former president of the National Academy of Sciences, and a fellow and past president of the American Institute of Electrical Engineers.

Born in Pasadena, Calif., on September 5, 1879, Dr. Jewett received his A.B. degree from Throop Polytechnic Institute (now California Institute of Technology) in 1898 and four years later received a Ph.D. degree from the University of Chicago. He was an instructor in physics in 1903–1904, and a lecturer in 1905–1907 at M.I.T., during which time he took graduate studies at the Institute. In 1904, Dr. Jewett joined the American Telephone and Telegraph Company and throughout the rest of his life was identified with the Bell System. He became the first president of the Bell Telephone Laboratories when it was organized in 1925, and held that position until 1940 when he became chairman of the Board. He retired from active service in 1944.

Dr. Jewett was a term member of the M.I.T. Corporation from 1928–1933, and since 1933 has been a life member. He was president of the Alumni Association during 1939–1940, and from 1925 until a short time before his death served on various Visiting Committees of the Institute.



Altman-Pach

Frank B. Jewett, '03

Life Member of the Corporation, 1933–1949

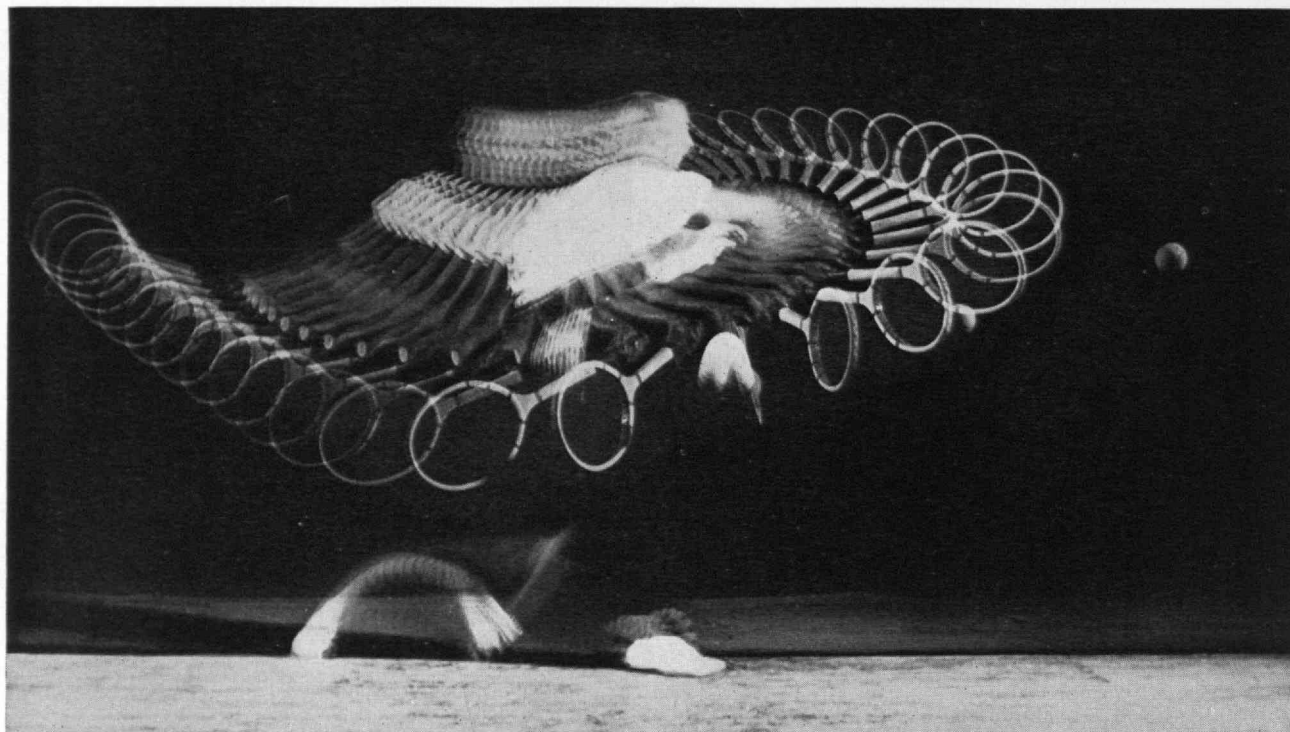
For his work on the vapor density of sodium vapor, magnetic change of resistance in bismuth, effect of pressure on insulation resistance, and particularly in electrical communication, Dr. Jewett has a distinct claim as American scientist.

Dr. Jewett was a member of many scientific and engineering societies and the recipient of many honorary degrees. In recognition of his work for the Office of Scientific Research and Development he was awarded the Medal for Merit in 1946. Other honors he received include the Edison Medal, the Faraday Medal, the John Fritz Medal, the Franklin Medal, and the Washington Award. He was president and trustee of the New York Museum of Science and Industry, and trustee of the Carnegie Institution of Washington, Woods Hole Oceanographic Institute, and Tabor Academy.

Corporation News

APPPOINTMENT of Henry Loomis as Assistant Secretary of the M.I.T. Corporation has been announced by President Killian. Mr. Loomis, a resident of Manchester, Mass., has been administrative assistant to the president of M.I.T. since October, 1947. He came to M.I.T. from the University of California, where he was associated with the work of the United States Atomic Energy Commission.

A member of the Class of 1941 at Harvard University, Mr. Loomis held a Navy commission during World War II, reaching the rank of lieutenant commander. On duty with the staff of the Commander-in-Chief Pacific, he served for several years in the Pacific Theater and later briefly in Washington.



Harold E. Edgerton, '27

Shown in the lobby of the Rogers Building at M.I.T. during January was the first comprehensive exhibition of photographs made with stroboscopic light since the development of this photographic technique by Professor Harold E. Edgerton, '27, of the Department of Electrical Engineering. Typical of almost 100 color and black-and-white photographs displayed, is this example of a forehand drive made at the rate of 60 exposures per second, having a duration of $1/50,000$ second.

Art in Contemporary Life

HISTORIAN of note and one of the leading figures in the promotion of modern architecture and art, Sigfried Giedion has been appointed visiting professor in the Department of English and History at the Institute for the term starting in February. In announcing the appointment, Professor Howard R. Bartlett, Head of the Department, said that while at M.I.T. Dr. Giedion will conduct a seminar, "Civic Centers and Social Life," and give a series of five public lectures on "The Role of Art in Contemporary Life."

Born in Switzerland in 1894, he was educated there and in Germany and Italy. Trained first as an engineer, he later began the study of art history. As a student of Heinrich Wölfflin at Munich, he became one of the younger exponents of the Swiss historical tradition which began with Jacob Burckhardt. Dr. Giedion's interest in contemporary art and architecture, and his personal contact with the leading artists, shaped his historical methods. His fundamental principle in treating historical phenomena is: "History is never stilled. It is ever in movement like the generation observing it. There are no banal things in History. Relationship and contact with other disciplines form the backbone of History Writing."

When in 1928 the International Congress of Modern Architecture was founded, Dr. Giedion was appointed its general secretary. Such publications of the C.I.A.M. as *Dwellings for the Lower Income Classes* (1930) and *Can Our Cities Survive?* (1943) have been issued under his supervision.

As a counselor of the Kunsthauus at Zurich, it was possible for him to arrange in the early 1930's the first

over-all shows of such artists as Picasso, Juan Gris, Fernand Geger, and Hans Arp. In 1938-1939, Dr. Giedion was the Charles Eliot Norton professor at Harvard, and from 1942-1945, he was a visiting professor at Yale. Since 1946 he has been at the Federal Institute of Technology at Zurich. His works best known in the United States are *Space, Time and Architecture*, and *Mechanization Takes Command*. Another book, *A Decade of New Architecture*, is now in preparation and will be published in Zurich this spring.

Hunsaker and McAdams Honored

NEW honors came recently to two well-known M.I.T. professors: one in the Department of Aeronautical Engineering, and the other in the Department of Chemical Engineering, both of whom have served the Institute for many years.

President Truman has appointed Jerome C. Hunsaker, '12, Head of the Department of Aeronautical Engineering, to serve on the National Advisory Committee for Aeronautics for a five-year term, expiring December 1, 1954. Dr. Hunsaker's record of public service, particularly in fields related to aviation, already includes service as chairman of the N.A.C.A., but the recent appointment assures his services for another half decade.

On December 6, 1949, Professor William H. McAdams, '17, of the Department of Chemical Engineering, was presented the William H. Walker Award by the American Institute of Chemical Engineers for his work on heat transfer. The Walker Award, named for the late William H. Walker, who was also a pro-

(Continued on page 216)

BUSINESS IN MOTION

To our Colleagues in American Business ...

Because everybody spends a lot of time indoors, under a roof of one kind or another, the building industry has always been of prime interest to Revere. There are two reasons for this concern. One is the obvious consideration — a good, weather-tight, long-lasting building should contain adequate amounts of sheet copper in the appropriate places. The other is our feeling that, as a leading producer of sheet copper, we have an obligation to the public to see that there is an understanding of the economy and satisfaction obtained through the correct use of this metal for waterproofing.

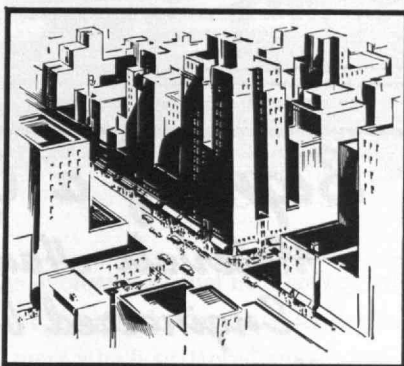
Hence Revere some years ago embarked upon an extensive program aimed at developing the engineering principles, specifications and designs for successful application of sheet copper to all types of buildings. The information thus obtained has been freely published for all to follow, with assurance of lasting protection, whether for a home or a hospital, an office building, hotel or factory. Though anybody's copper can be used according to these specifications and designs, naturally Revere hopes it will be Revere copper, and indeed we are getting our share of the business. It is a great satisfaction to us not only to sell the copper, but to know that it is being applied in such a way as to give economical, enduring protection. This is especially important in these days of high labor costs, which make repairs due to the use of inferior materials or improper installation cost so much more than the price of good materials and workmanship, if used in the first place.

Now Revere has expanded its service to the building trades by offering solid copper flashing for

masonry construction. The flashing is of chief interest to those designing and building large commercial structures, though of course it is also applicable to the private homes built of brick and stone. There is now available thru-wall flashing for economical and enduring protection against seepage and leaks at copings, parapets, belt courses, sills, spandrel beam facings and similar masonry applications. There is a reglet and reglet insert, also of solid copper, for waterproofing spandrels at costs comparable with or less than mopped-on waterproofing. There is vertical rib siding for use on high parapet walls, penthouses, and so on. All these items are pre-formed, and the simple directions for their use can be easily followed by any contractor, builder, or sheet metal worker. These new Revere Copper Products are available through sheet metal distributors throughout the country.

Though we have given these new items the widest possible publicity, we realize that in this vast country it is unlikely that absolutely everybody concerned will learn immediately about them and how much they can add to true economy.

It takes time for news to get around. This time-lag is a problem for every company offering a new service or product. Recently we saw an advertisement of an important industrial material (felt) in which it was suggested: "Write us what you make, and benefit by our constructive ideas." That is good advice. Revere therefore recommends that no matter what you buy, whether metals or felt, chemicals or plastics, building materials or containers, you give your suppliers the opportunity to collaborate with you on the selection and application of new as well as old materials.



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fessor of Chemical Engineering at M.I.T., has been given since 1936 for distinctive contributions to literature of chemical engineering. Professor McAdams is the third from M.I.T. to be given this honor. The others were Thomas K. Sherwood, '24, Dean of Engineering, award winner in 1941, and Professor Hoyt C. Hottel, '24, Director of Fuels Research Laboratory, who was given the medal in 1945. Professor McAdams has done much important research and consulting work in heat transfer and has pioneered many recent developments. When the American Institute of Chemical Engineers convened in December for their annual meeting, Professor McAdams reviewed fundamentals of the various types of heat transfer.

F. J. Curtis, Vice-president of Monsanto Chemical Company and retiring President of the professorial group of chemical engineers, made the presentation to Professor McAdams whom he cited "for his long series of authoritative publications in the field of heat transmission, represented in recent publications by the papers: 'Measurement of Recovery Factors and Coefficients of Heat Transfer in a Tube for Subsonic Flow of Air,' and 'Heat Transfer from Single Horizontal Wires to Boiling Water.'"

Study for Executives

FOURTEEN young business executives, largest group in the 13-year history of the executive development program at M.I.T., will be awarded Sloan Fellowships in 1950. Awarded to outstanding young executives in a nationwide competition, these fellowships cover a year of advanced study in economics and business administration at the Institute and are aimed at preparing men for higher executive responsibility.

The fellows will be drawn from both large and small companies in various types of industry throughout the country. The winners of the fellowships will participate in a special program consisting of seminars, classes, and field investigations aimed not only at increasing technical managerial skill, but also at deepening their understanding of the social and economic implications of their work. They will study in the Institute's Departments of Business and Engineering Administration, and Economics and Social Science, and will have an opportunity to conduct a special investigation in some selected field of industrial activity, such as finance, production, distribution, or labor relations.

Applications for the awards must be made by February 24. Recipients will be selected on a competitive basis by M.I.T. after consideration of the applicants' records and references, and consultation with their

(Concluded on page 218)



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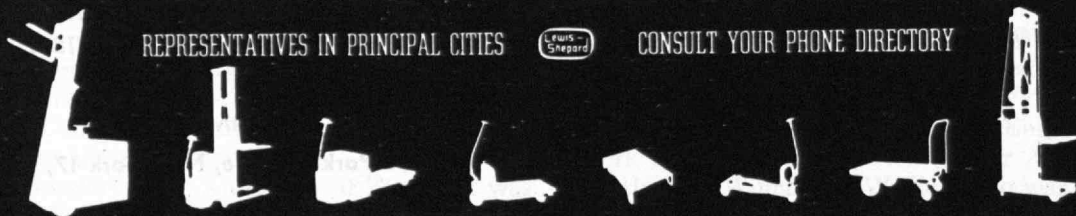
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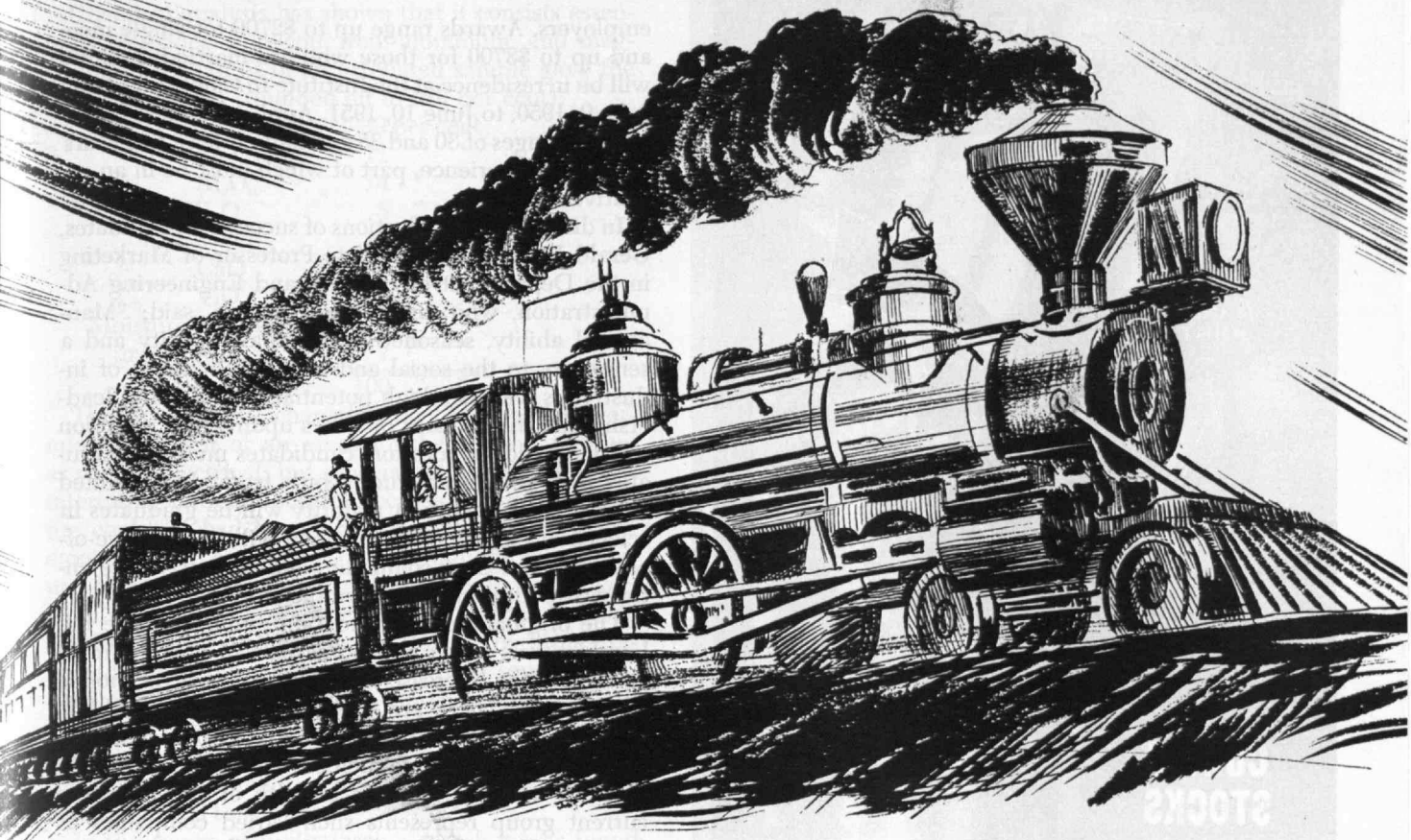
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THE INSTITUTE GAZETTE

(Concluded from page 216)

employers. Awards range up to \$2700 for single men, and up to \$3700 for those who are married. Fellows will be in residence at the Institute in Cambridge from June 9, 1950, to June 10, 1951. Applicants must be between the ages of 30 and 35 and have at least five years' industrial experience, part of which must be in an executive capacity.

In discussing qualifications of successful candidates, Gerald B. Tallman, Associate Professor of Marketing in the Department of Business and Engineering Administration, who directs the program, said: "Managerial ability, seasoned intellectual capacity and a sensitivity to the social and civic implications of industry, as well as a high potential for industrial leadership are the primary qualities upon which selection will be made. In addition, candidates must be graduates with good academic records from an accredited college or university. A majority will be graduates in science or engineering. The men will be on leave-of-absence from their companies and must have the enthusiastic support of their employers."

The original Sloan Foundation grant for these fellowships was made in 1938 as part of a program to promote "the increase and diffusion of economic knowledge." There are 47 past recipients of M.I.T. Sloan Fellowships, among whom are 10 current fellows who will complete their studies in June, 1950. As evidence of the program's breadth of coverage, the current group represents such varied companies as Corning Glass Works, Pratt and Whitney, Johnson and Johnson, Ford Motor Company, Illinois Bell Telephone, Richmond Engineering, Goodyear, National Gypsum, Radio Corporation of America, and Standard Oil Company of California.

Excellence in Graphic Arts

FOR the sponsorship of an outstanding product of American commercial printing, a Certificate of Excellence has been awarded to the School of Architecture and Planning at M.I.T., by the American Institute of Graphic Arts.

The award, made in connection with the 1949 Printing for Commerce Exhibition, is for a brochure entitled "Education of Architects and City Planners" designed by Professor Gyorgy Kepes of the School of Architecture; text for the brochure was prepared by Henry-Russell Hitchcock, lecturer in architectural history.

Crew Coach Honored

JAMES B. McMILLIN, varsity crew coach at the Institute, was elected president of the Rowing Coaches Organization of America at its recent annual meeting in New York. In this post, Mr. McMillin succeeds Harrison Sanford of Cornell University.

Beginning his 10th season as head of the Engineers' crews, Coach McMillin came to M.I.T. in 1939 after captaining a championship University of Washington crew in Seattle.

THE TREND OF AFFAIRS

(Continued from page 202)

Chemical analysis has shown that it consists essentially of oxides of silicon, iron, aluminum, and magnesium. An analysis of an exfoliated sample gave the following results (rounded off to full per cent):

	SiO ₂	39 per cent
	Fe ₂ O ₃	11 " "
	Al ₂ O ₃	14 " "
Ma ₂ O + K ₂ O	5 " "	
	MgO	22 " "
	CaO	1 " "
	TiO ₂	1 " "
Moisture and various impurities	7 " "	
	100	" "

The outstanding characteristic of expanded vermiculite is that of an exceptional insulator, thermal as well as electrical, but especially thermal. This was interesting but unimportant because so little vermiculite could be had at any one time that, at best, the amount would have been sufficient only for laboratory use. But some 20 years ago a very large deposit of vermiculite was discovered near Libby, Mont. By 1946 the *Minerals Yearbook* of the Bureau of Mines reported production of this material from seven states: Colorado, Montana, Nevada, North Carolina, South Carolina, Texas, and Wyoming. Whereas the average annual production between 1935-1939 was 18,000 tons, by 1946 annual production of vermiculite had risen to 86,000 tons.

In the course of preliminary research it was found that expanded vermiculite was not only a very poor conductor of heat but that it was also capable of absorbing large amounts of heat. Furthermore, it did not change itself, even when heated to a high temperature for a long time. In addition to all this, it has a very low specific gravity, weighing about six pounds per cubic foot. It could be used loose as a filler in wall spaces (as rock wool is) or in lieu of sand in concrete, or as an admixture to plaster. It is also used in insulating refractory brick, in lightweight and fireproof structural units, in non-load-bearing partition tile, and as a packing material around glass acid bottles and carboys.

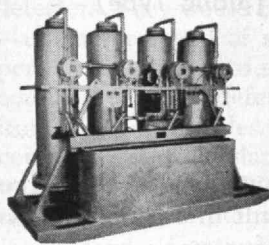
The main reason for using expanded vermiculite in concrete is, of course, the fireproofing and fire-resisting feature, but there is a very considerable weight reduction among the by-products. One example is the 35-story Mercantile National Bank Building in Dallas, Texas. It has been estimated that the weight of the concrete for this building would have been 42,124,523 pounds if the customary cement-sand mixture had been used. The mixture of cement and expanded vermiculite actually used weighed 10,855,870 pounds. This reduction in weight reduced the amount of structural steel in turn: 4,400 tons of steel were actually used. The estimate for conventional construction was 6,280 tons.

Demonstrations of its fire-resisting qualities are especially impressive. A one-inch slab of cement-vermiculite (Concluded on page 220)

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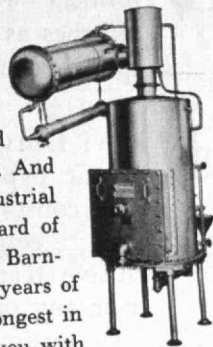


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THE TREND OF AFFAIRS

(Concluded from page 219)

miculite concrete was placed on a sheet of paper, and a two-pound magnesium incendiary bomb was permitted to burn itself out on top of the slab of concrete. At the end of the experiment the paper under the concrete slab was found to be uncharred. Another experiment consisted of a simulated fire in a building. The floor of the upper story consisted of two inches of vermiculite concrete. This was supported by a steel beam, and under the steel beam there was a ceiling consisting of a one-inch-thick slab of vermiculite plaster. That ceiling was heated to 2,000 degrees F., corresponding to an unusually hot fire in the lower story, and hot enough to weaken structural steel dangerously. This heating was continued for a period of four hours, far beyond the time a real fire in any office building would be likely to last. At the end of that period, the temperature of the floor in the upper story was measured: it was 203 degrees F. which is not quite high enough to boil water.

Standard Frequency and Time

FOR many years time and standard frequency signals, accurate to within a few parts in one hundred million, have been broadcast from Station WWV, operated by the National Bureau of Standards. The usefulness of such transmissions has been increased with a change of transmitting schedule, effective January 1. Standard time signals, announced both in code and voice every five minutes, are now being transmitted on carrier frequencies of precisely 2.5, 5, 10, 15, 20, 25, 30, and 35 megacycles per second and may be received on an ordinary short-wave receiver. Each carrier is modulated by standard frequency tones of 440 and 600 cycles per second, transmitted in alternative five-minute intervals. Short pulses, heard as faint clicks, mark second intervals.

NEXT WAR'S WEAPON

(Continued from page 204)

Air-to-air rockets were also used by the Germans in World War II against Allied bomber formations. These weapons will come into prominence as combat is begun at greater ranges and it is entirely possible that the future will bring forth a heavily armored destroyer, fitted with rocket-launching turrets. The rockets could be aimed by radar and detonated by proximity fuses when they reached their targets. The larger projectiles might even be guided, either from the launching airplane or from the ground. These destroyers, however, will undoubtedly represent a transitional stage in warfare and will be rapidly superseded.

By employing short-range rockets, the "Jato," or jet-assisted take-off, also has great practical importance, for it permits a considerable increase in take-off weight, and hence performance, and it can be used

to reduce the length of the runway needed by an aircraft to become air borne.

However, it is the medium-range rocket, which was beginning to appear during the final stages of World War II, that holds much promise in revolutionizing air combat as we know it today. This type is exemplified by the medium-range rocket interceptor, of which both piloted and guided versions were under intensive development by the Germans at the end of hostilities in Europe.

One of the piloted machines, the *Me-163*, actually became operational while a second, the *Natter*, was undergoing short test flights when the war ended. Both were manned rockets of a very short endurance (five minutes under full power to be exact) but they had phenomenal rates of climb. The *Me-163*, for example, could get up to 40,000 feet in three minutes, while the *Natter* could get that high in little over one minute. Intensive future development in this field undoubtedly will result in the conventional fighter being superseded by this type of aircraft. Their high rate of climb would enable them to stay on the ground until the enemy bombers were only a few miles away. They would then go up, almost vertically, into action, break off the engagement, and return to the ground. If they launched rocket projectiles into the bomber formations, the latter would find it very difficult to carry out the assigned mission. The defense would have to be accomplished either by having flying destroyers in the formations, or by the use of such enormous speed that interception was impossible. This, in effect, means the replacement of the bomber by the

long-range rocket, and at this point the pilot begins to disappear from the picture.

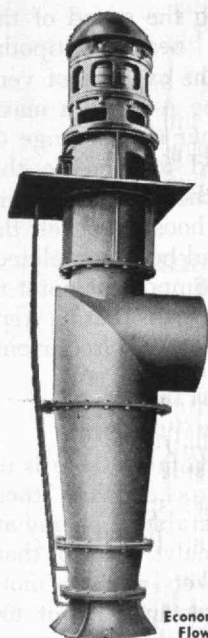
Science has proven that the human body can withstand only limited accelerations, can respond to only a few stimuli at a time, and has comparatively slow reactions. The speed of attack in air warfare is steadily increasing and the 3,400 miles per hour of the A-4 is only the beginning. Man can never hope to fight against such speeds. Skill, courage, and resolution will not suffice and the time will come when only machines can fight machines.

German War Research

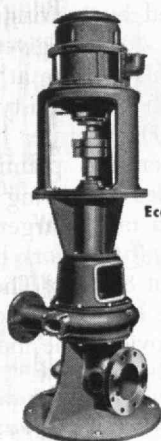
At the close of World War II, the Germans were discovered to have been working desperately on a large number of guided rockets, such as the *Rheintochter*, *Schmetterling*, and *Wasserfall*. Some of these rockets had been tested, and claims of one contact in four had been made with experimental models. These missiles, made with experimental models, were to be controlled from the ground by radio and directed into the bomber formations where they would "home in" on their targets by radar or infrared detectors. They would be capable of very high speeds — up to the speed of sound — and when they were perfected, it is hard to see how conventional bombers could successfully defend themselves against attacks from guided missiles. Elaborate countermeasures could be tried, similar to those used in the radar war, but it is not feasible or desirable to jam the entire radio spectrum. Automatic homing rockets might be

(Continued on page 222)

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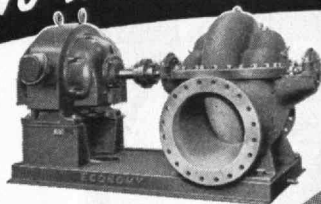


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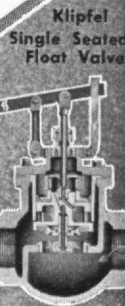
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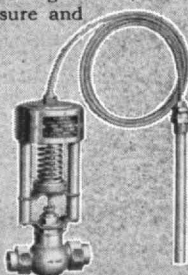
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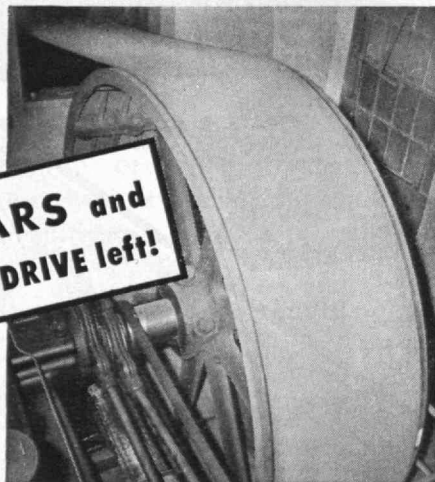
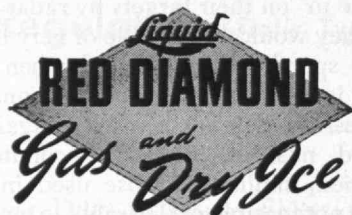
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NEXT WAR'S WEAPON

(Continued from page 221)

rendered harmless for awhile, but there would not be any effective defense against a ground-controlled projectile carrying television and homing in on the hundreds of kilowatts of heat thrown out by the bomber's engines. Such rockets have already been developed and do not represent any great advance in existing technique.

These weapons may mark the end of the man-carrying fight but not necessarily the end of the fighter pilot who represents a complexity of skills difficult to replace by machinery. There have already been several examples of missions largely controlled from the ground. "Oboe" bombing and fighter sweeps, radar-controlled, are two examples. The remote-controlled fighter, operated by a pilot many miles away, is therefore a logical development.

Guided missiles will also be a boon to naval operations and may well replace fighter aircraft for defensive purposes in the very near future. The large vulnerable carrier will no longer be required to provide fighter cover as its primary mission. Then, too, the necessity of getting aircraft safely back down on the carrier, after an action, will be eliminated, thus giving the fleet greater freedom of action. To a large extent, guided rockets could replace heavy guns for long-range engagements and thereby provide a saving of weight of many thousands of tons in the case of capital ships.

The guided rocket appears to be the only conceivable defense against the long-range rocket bomb. This type was developed by increasing the speed of the rocket sufficiently to be given nearly antipodal ranges, although this is done at the expense of very small pay loads. The German-type A-4 had a maximum speed of 3,400 miles per hour and a range of 220 miles. The Germans planned to increase this range to 3,000 miles by giving the A-4 wings and launching it from a much larger booster rocket, the A-10, which would, if the work had been completed, have weighed about 85 tons. The important point in connection with the long-range rocket is that its step-rocket principle provides one method of circumventing the velocity pay-load view.

Rocket Defense

Even today, once they have been fired, there is no proven defense against guided rockets, and their launching sites are much less vulnerable to enemy attack than airfields. A preliminary analysis reveals that, with conventional explosives, rockets may be more economical than bombers for ranges up to about 400 miles. As compared with heavy-bomber operations, the enormous saving in man power required for a rocket offensive is also an important factor, as well as the fact that rockets can be mass produced at very little cost.

Today it requires a rocket weighing about 100 tons to deliver a pay load of one ton at a distance of 3,000 miles, inasmuch as 70 per cent of this weight is in fuel. Atomic bombs weigh only a few hundred pounds and

(Continued on page 224)

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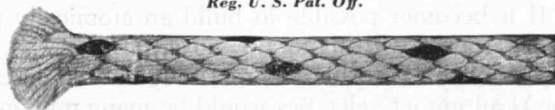
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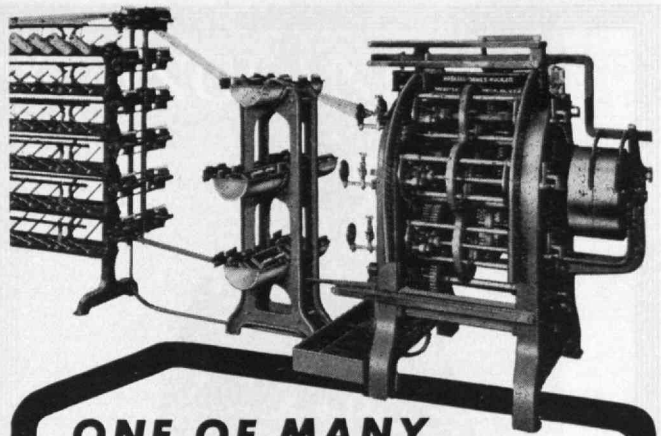
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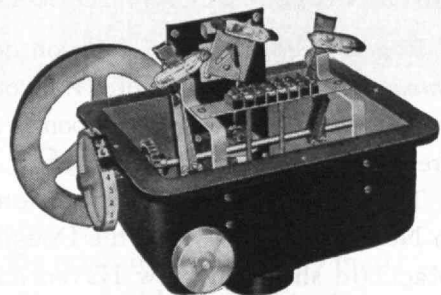
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need never be much larger, though their efficiency, of course, will increase. These two facts seem to point out the final end of the very heavy bomber.

It is true that the main objection to the rocket as a long-range weapon is its inaccuracy; but this defect will certainly be overcome in time by the use of target-locating devices, radio lattices (fixes), or television. It would be virtually impossible to jam a rocket controlled by a locked microwave beam from a high-altitude relay airplane several hundred miles away, especially since the radio control might be required only for a very few seconds when the projectile was nearing its target. It will also be possible to develop entirely self-contained controls similar to those used in the later A-4's fired against London. Rockets would contain course integrators which could be set for any required destination and which could not be affected by any external signal. Once launched, only an actual collision could deflect such a projectile from its target.

As has been mentioned before, no complete defense is possible against such weapons. The only defense of any kind would be the guided rocket. Visualize, for a moment, the development of small machines capable of accelerations of 100 or more times that due to gravity, and homing in on radio, radar, or even local gravity fields. Such machines would be equipped with various means of identification — (Interrogation: friend or foe) — to prevent them from attacking each other. The possibilities here are endless; for, among other things, science might inject suitable metals into the blast coupled with spectrum analyzers for interrogation. However, even such highly developed defensive machines would be hard put to intercept, in a matter of seconds, projectiles traveling 3,000 miles per hour or more.

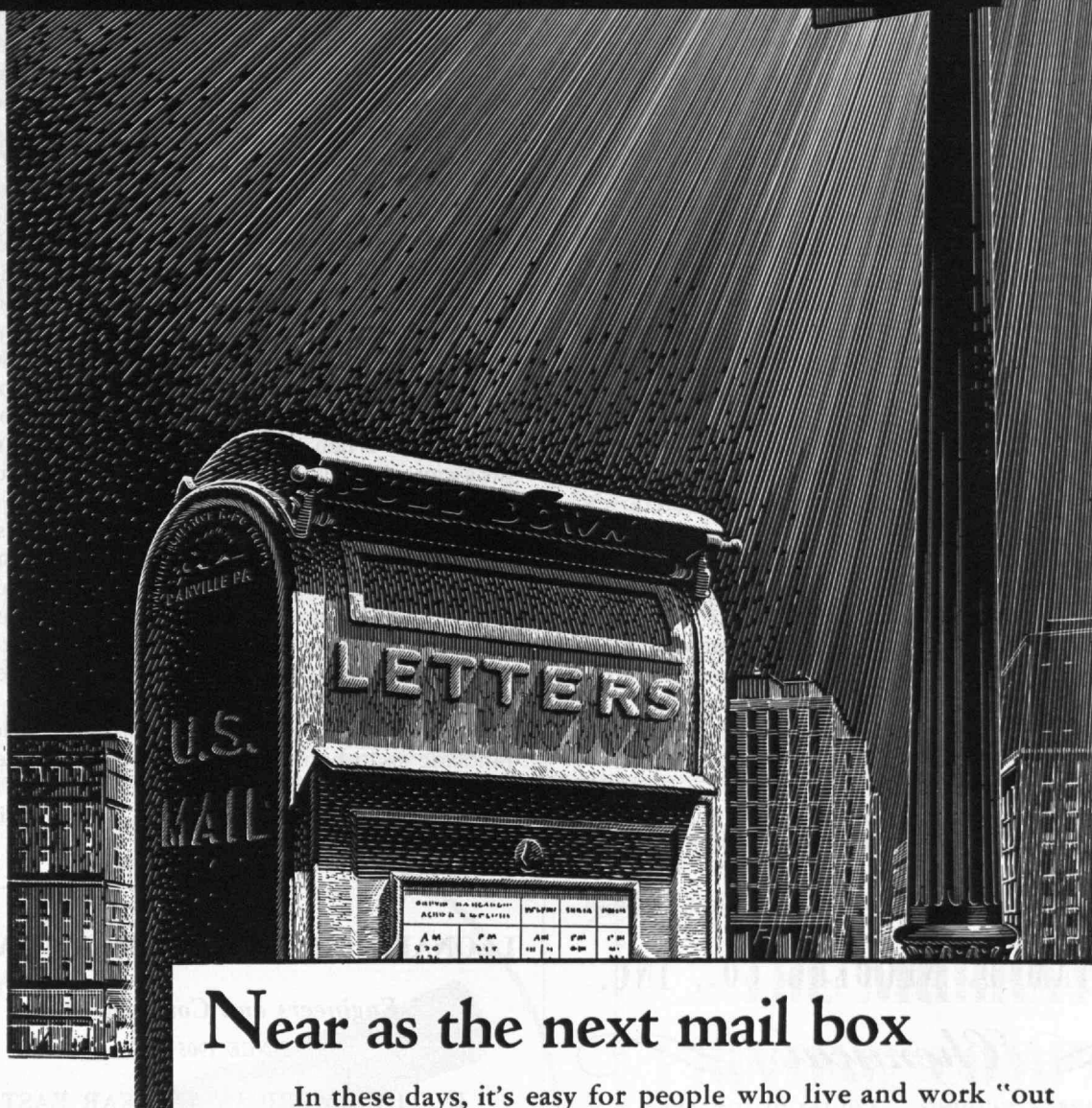
Rockets and the Atom Bomb

Many engineers and scientists have advocated the use of the rocket as an ideal means of delivering atomic explosives. This may soon prove to be the only method that can be used without destroying the attacker. Another important advantage is that the enormous impact velocity of the rocket greatly simplifies the detonation problem if a ground burst is required. The subcritical masses have only to be placed on the axial line and they will be united at a speed which will prevent premature detonation and make unnecessary the complicated gun arrangements in the present atomic bombs.

If it becomes possible to build an atomically propelled rocket with motors of no more than the efficiency of the Hiroshima bomb, roughly 0.1 per cent, the resulting jet velocities would be many millions of miles an hour, and the theoretical limit would be the velocity of propagation of light itself. Even though such speeds would be out of the question inside the atmosphere, it would be a comparatively simple matter to design rockets flying under continuous thrust at very high accelerations along constantly randomized paths. The interception of these rockets by any ma-

(Concluded on page 226)

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NEXT WAR'S WEAPON

(Concluded from page 224)

terial projectile would be virtually impossible, since, even if they could be detected, their destinations could not be foreseen until it was too late.

The Germans actually had one type of long-range piloted rocket in mind at the end of World War II, but this type has too few military advantages. For one thing, it does not provide adequately for the safe return of the crew. Such rockets might be valuable for reconnaissance, but even here they would eventually be superseded by the guided rocket carrying television equipment.

A true rocket bomber, a manned rocket delivering explosive loads and capable of returning to its base, appears to have no advantages over the long-range guided rocket, and it has some disadvantages, particularly vulnerability and low performance, since it has to carry a much greater weight of fuel as well as the equipment needed by the crew. However, General Henry H. Arnold, in his report to the Secretary of War, has suggested that such machines would be required to launch rockets from unexpected quarters if the defense against long-range projectiles became too effective. These machines would be true space ships, traveling in trajectories outside the atmosphere. This argument does not seem to hold, since guided rockets could be designed to follow courses at least as tortuous as those manned machines and at much greater speeds. An interesting point to note in connection with these machines is that they could not employ bombs in the ordinary sense of the word, since any part of the load would share the ship's or-

bital motion and so would not be capable of falling back to earth.

A rocket which attains a speed of five miles a second above the atmosphere would never return to earth but would continue to circle it forever in an astronomical orbit. At a higher speed, for example, seven miles a second, the rocket would escape from the earth's gravitational field completely and recede into interstellar space.

While chemical fuels are used, these velocities can only be achieved by step rockets of very small payload; such machines are likely to be of scientific value only. The advent of the atomic drive would, however, change the picture completely, for, if conversion efficiencies of 0.1 per cent were achieved, fuel loads of only a few per cent would be ample for journeys to be nearer planets. This is mentioned only to show the spectacular possibilities which will be an immediate outcome of any harnessing of atomic power to rocket propulsion. When that time comes, and it is not too far away, vistas will be opened before which our present imagination falters. The least of the achievements one may expect to see is the establishment of stations in closed orbits at heights of 1,000 miles or more, circling the worlds in periods of a few hours like artificial moons. The Germans were actually planning such stations and such an arrangement does present an attractive solution to the problem for world surveillance and control.

These futuristic word pictures may appear to be so fantastic as to be unworthy of serious consideration, but they are the logical, inevitable outcome of one aspect of atomic energy and, as such, cannot be ignored in rocket development.



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ATOM-BOMB WORLD

(Continued from page 206)

2. That the General Assembly be reconstituted as the legislative branch of the world government in which the citizens of the member states are represented on an equitable basis.
3. That the General Assembly, in addition to its present functions shall have the power:
 - (a) to make laws prohibiting, or otherwise controlling, weapons of mass destruction and, so far as necessary for that purpose, regulating the uses of atomic energy;
 - (b) to make laws providing for such inspection as is necessary or appropriate to the execution of the foregoing powers;
 - (c) to provide for appropriate civil and criminal sanctions for the laws enacted pursuant to the foregoing powers;
 - (d) to provide and maintain such police forces as are necessary for law enforcement.
4. That independent judicial tribunals be created with jurisdiction over cases and controversies arising under laws enacted by the General Assembly or involving questions concerning the interpretation of the charter of the United Nations.
5. That a Bill of Rights be designed for the protection of persons affected by laws enacted by the General Assembly.
6. That the Security Council be reconstituted as the executive branch of the world government with the power:
 - (a) to administer and insure the enforcement of the laws; and
 - (b) under the direction of the General Assembly, to perform its present functions as defined in the charter.
7. That the powers not delegated to the General Assembly be reserved to the member states.

These proposals and objectives represent the essence of the best thought upon the subject, and are, in fact, the proposals and objectives drawn up by the Rollins College Conference on World Government. They represent the minimum requirements necessary for the creation of a world government capable of averting the catastrophe of another war in the atomic era.

Congress Awaits

Since the first reaction to the consequences of the atom bomb has gradually died down and been replaced by a concentration on a possible war with Russia, the situation of mankind has become more dangerous than ever. Congress is waiting for the people to tell it what to do. If we raise our voices, we shall be heard. If all of us join our voices together, what we have to say will prevail. There is very little time left. Here is what we can do:

1. We can make our congressmen aware of the reasons for the necessity of world government, and can urge them to make their influence felt on the subject.
 2. We can urge the United Nations to adopt the above proposals.
 3. We can support all organizations having world government as their objective.
 4. We can organize a world-government group in our neighborhoods if one does not already exist there.
 5. World government implies co-operation, not competition, between the peoples of the earth. One of the things we can do immediately is to cast our vote for peace by beginning to live co-operatively. The only defense against the atom bomb is the moral aspiration of people to live in peace with
- (Concluded on page 230)

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ATOM-BOMB WORLD

(Concluded from page 228)

one another in a united world under a common world government.

Freed from the menace of war, atomic energy can be, for all of us, in all nations, the great cohesive force which makes one world possible. To assist us toward realizing this aim, we have today at our disposal the philosophy, firmly based in science and in religious teaching, of the unity of all mankind; a philosophy which creates emotional force as well as intellectual conviction; a philosophy which creates the consciousness of a common purpose in mankind, which at once establishes the principle of the right to cultural self-determination and the international co-operation of all mankind.

The scientists who created the atom bomb have themselves set us the pattern by means of which this purpose can be realized; for, into the creation of the atom bomb went the genius of many nations. The free and untrammelled co-operative labors of the scientists of the whole world contributed to the discovery of atomic energy. Without world co-operation of scientists, that discovery would have been quite impossible. We knew that atomic energy was a real and not an imaginary thing before we discovered how to release it. We have now to conquer it. Similarly, scientists know that mankind is one, and are in process of discovering the means of releasing those energies which will make all the world believe it. But the task is far more difficult than that of the nuclear physicist, far more difficult and far more complex. Thousands of us will have to be engaged upon a thousand different fronts in order to solve our problem; and, we can solve it only as the nuclear physicists solved theirs: by co-operation. In co-operation, and in unity on a world scale, lie the strength which will make humanity safe for mankind. Now is the time for clear and careful thought implemented by resolute action. Unless we act with intelligence and resoluteness now, we may never have another chance.

THE DELAYED INVENTION

(Concluded from page 210)

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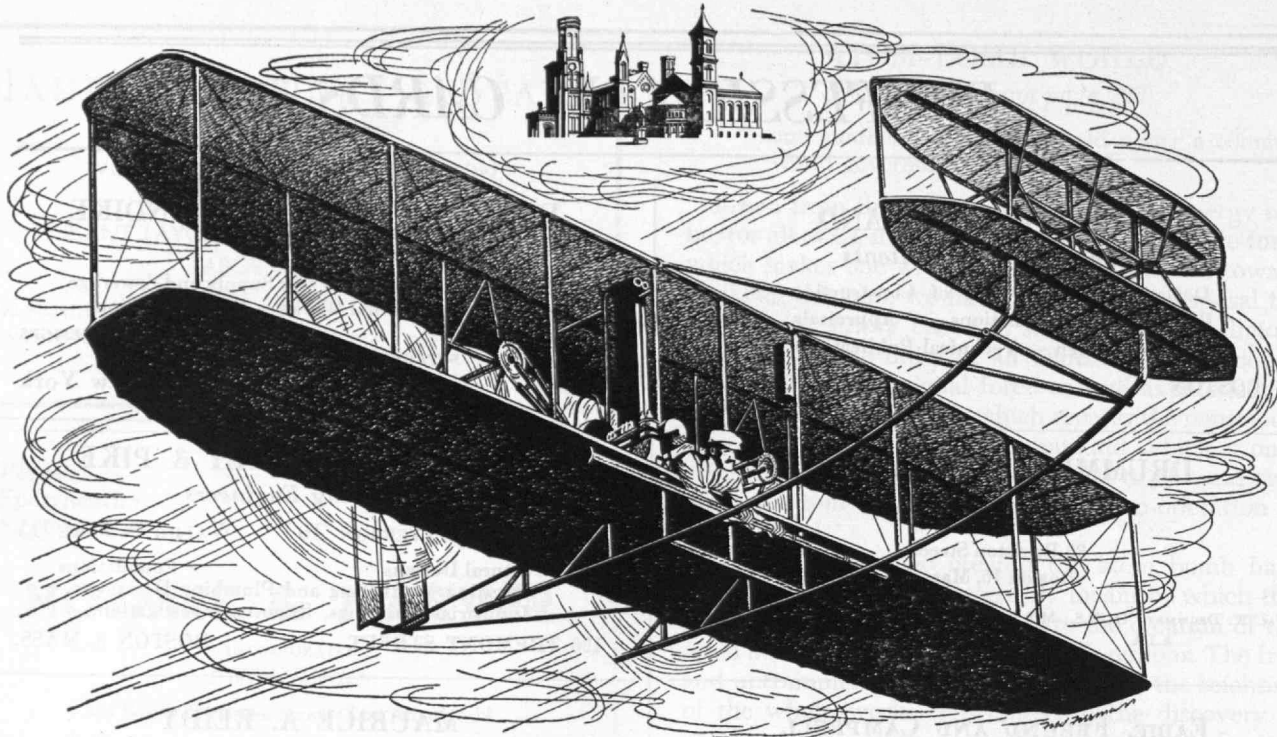
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Alumni AND Officers IN THE News

Speakers

DEAN PEABODY, JR., '10 discussed the "Basic Principles of Prestressed Reinforced Concrete Design" at a meeting of the structural section of the Boston Society of Civil Engineers held on January 11.

ROBERT E. WILSON '16 presented a paper entitled, "API Wildcatting in Some Interesting Areas," to a general session during the 29th annual meeting of the American Petroleum Institute in Chicago, Ill., on November 9.

OMAR H. SOMERS '33 was the guest speaker at a dinner meeting of the Western Massachusetts Society for Quality Control held on January 5 at the Hotel Sheraton in Springfield, Mass. Mr. Somers discussed, "Quality Control in Continuous Process Industries."

ALAN P. SCHREIBER '39 discussed how products of atomic processes, particularly radioisotopes, are applied industrially, at a meeting of the Worcester section of the American Society of Mechanical Engineers. The meeting was held on January 5 at the Worcester Polytechnic Institute.

GEORGE W. CLARK '41 brought to the Capital section of the Illuminating Engineering Society his investigations and conclusions concerning television studio lighting when he was the speaker at the Society's meeting held on December 9.

ROBERT B. NEWMAN '49 told of "Room Acoustics and Its Influence on Audio System Performance" at a meeting of the audio group, Boston section, Institute of Radio Engineers, held on January 19 at M.I.T.

Authors

GREGORY M. DEXTER '08 is the author of several articles that were noted in reprint form recently. "Municipal-water Needs vs. Strip Coal Mining" was reprinted from *Mining Transactions*, Volume 184, May, 1949, issue; "Costs Can Be Reduced," which was written in collaboration with L. C. Dillon, appeared in the *National Bottlers' Gazette* of October, 1949; and "Elimination of Kraft Mill Odors" was published in the November 17, 1949, issue of the *Paper Trade Journal*.

VANNEVAR BUSH '16 brings an important message to all mankind in his book,

Modern Arms and Free Men. Published by Simon and Schuster, 1949.

HORATIO BOND '23 reviews the national plans for civil defense made in the Hopley Report in his article, "Military and Civil Confusion About Civil Defense." This article was requested by the *Bulletin of the Atomic Scientists* and appears in the November, 1949, issue, Volume 5, Number 11.

ROBERT S. HARRIS '28 is the editor of Volume VII of *Vitamins and Hormones* which was published in December, 1949, by the Academic Press, Inc.

WILLIAM W. BUECHNER '35 and EDWARD N. STRAIT, JR., '48 are coauthors of the article, "Photo-Tube Input Impedance for a Voltage Stabilizer," published in *The Review of Scientific Instruments* of November, 1949, Volume 20, Number 11.

ROBERT E. HAGE '40 and COURTLAND D. PERKINS '41 collaborated on the book, *Perkins-Hage: Airplane Performance, Stability, and Control*, which was published by John Wiley and Sons, Inc., in October, 1949. The text of their book is based on material developed by the authors while working together in the aerodynamics branch of the United States Air Force Materiel Command at Wright Field during the War and later expanded at Princeton and the Boeing Airplane Company.

LUTHER DAVIS, JR., '42, DARRACH E. NAGLE '47 and JERROLD R. ZACHARIAS, staff, are the authors of an article that was published in the October 15, 1949, issue of *Physical Review* entitled, "Atomic Beam Magnetic Resonance Experiments With Radioactive Elements Na²², K⁴⁰, Cs¹³⁵, and Cs¹³⁷."

GLENN C. WILLIAMS '42 reports on the "Basic Studies on Flame Stabilization" in an article published by the *Journal of the Aeronautical Sciences* in December, 1949.

ROBERT C. FLETCHER '43 is the author of an article that appeared in the November 14, 1949, issue of *Physical Review* entitled: "Impulse Breakdown in the 10⁻⁹ Sec. Range of Air at Atmospheric Pressure."

Interesting Miscellany

M. HERBERT EISENHART '07 was elected chairman of the board of the Bausch and Lomb Optical Company. Mr. Eisenhart

had been president of the company since 1935.

LOUIS TANNER '24 has received the Treasury's "exceptional civilian service award." The award was presented to Mr. Tanner by John W. Snyder, Secretary of the United States Treasury, during the conference of Customs collectors and appraisers which was held on December 6, 1949, in Washington, D.C.

GEORGE R. HARRISON, staff, who diligently served as editor of the *Journal of the Optical Society of America* for the past ten years, has now turned over the reins of the *Journal's* editorship to Wallace R. Brode.

Obituary

GEORGE H. EDDY, JR., '75, December 8.
DIXIE L. BRYANT '91, November 18.*
THOMAS M. KEENE '91, November 4.*
CHARLES W. RICKER '91, March 8.
GEORGE D. ROGERS '91, December 6.*
TOROS TOROSSIAN '93, October 19.*
HARRY C. WHITE '94, August 17.
CLEMENT B. TOWER '96, November 22.*
WILLIAM W. EATON '97, November 29.*
FREDERICK L. EDMANDS '97, October 27.*
RAYMOND F. BENNETT '99, December 9.*
ROSS HASBROUCK '99, September 30.*
W. HARRY MANDEVILLE '99, December 18.*
THOMAS NESMITH '00, November 9.
WILLIAM C. PICKERSGILL '00, October 2.
HENRY MANLEY '02, October 26.*
WALTER J. WELLMAN '02, November 13.*
EDWARD E. HOXIE '03, June 21.
FRANK B. JEWETT '03, November 18.*
HAROLD B. HARVEY '05, December 3.*
ALBERT L. SMITH '05, November 22.*
EMIL T. HENIUS '06, January 10, 1949.
RAPHAEL G. HOSEA '07, November 20.
CHARLES L. GABRIEL '12, September 24.*
EDWARD F. COLEMAN '13, January 17, 1949.
TENNY L. DAVIS '13, January 25, 1949.*
RICHARD L. AHEARN '16, June 21.
CHARLES T. GILLIARD '17, October 23.*
RAYMOND B. COLLIER '20, in June, 1949.
HENRY R. OSTER '21, August 1.*
CLINTON W. HOWARD '22, September 22.
LOUIS C. REYNOLDS '22, December 17.
ROBERT P. EVERETT '24, October 4.
ROBERT K. WELLS '24, April 15.
GEORGE L. WITHAM '25, November 12.*
CLEMENT F. COTTON '26, June 30.
ROBERT B. FAWCETT '30, October 11, 1948.

* Mentioned in class notes

News FROM THE Clubs AND Classes

CLUB NOTES

The M.I.T. Club of Buffalo

It was very much in evidence by the fine turnout at the November 15 meeting that the members of the Buffalo alumni group favor both roast beef and plant visits. The dinner was held at the Village Tavern in Williamsville, N.Y., and then the fellows adjourned to the Clarence Center, N.Y., plant of the National Gypsum Company. Needless to say, everyone had a fine dinner and a good visit together.

Among those who attended were: Robert L. Black'45, Howard E. Britton'38, M. Roy Burgwardt'48, George J. Chambers'12, William O. Christy'31, Henry F. Daley, Jr.'47, Mario S. Di Quilio'48, Richard E. Dow'01, Joseph M. Engel'37, Robert C. Fayfield'96, John M. Gaines'26, Bruce K. Gaviller'48, C. Malory Graves'36, Arthur B. Horton, Jr.'46, Vladimir Hwoschinsky'40, John H. Keefe, Jr.'47, Alan W. Ker'47, Warren H. Miller'45, Thaddeus J. Pieczonka'43, Fred W. Reusswig'49, Robert F. Rowe'48, Joseph R. Ryan'31, Norman S. Sinness'32, Thomas H. Speller'29, Russell M. Thayer'32, Stanley A. Tirrell'41, Ehrler Wagner'37, John T. Walsh'15, Jesse L. Wilson'41. — MATTHEW N. HAYES'36, *Secretary*, 45 Manchester Place, Buffalo 13, N.Y.

M.I.T. Club of Central Florida

Our winter dinner meeting was heartily enjoyed by 35 club members and influential guests. President J. J. R. Bristow '14 introduced Ronald Miller, a prospective member for the Class of 1955, Course IV. A. W. Higgins'01, President of the Florida Power Corporation, then introduced the M.I.T. men connected with the recent Florida Power tour who were his guests at our meeting for the evening. The meeting was considerably enlivened by their comments regarding Mr. Higgins' tour schedule, with particular reference being made to the hour set for arising. Last but not least among his guests was our old friend H. E. Lobdell'17, who gave us a few words and then proceeded to introduce our speaker for the evening, Paul M. Chalmers of the Admissions Office. Professor Chalmers gave us a very carefully outlined talk explaining the Institute's selective admission system. The enormity of carrying out this job in a successful manner is made apparent when one considers the fact that the Institute keeps in touch with over 2,200 high

schools throughout the United States alone. Professor Chalmers' talk was extremely informative, and aroused much interest among the members. The meeting was then adjourned and the informal discussions that followed were enjoyed by all.

Others attending were: Franklin O. Adams'07, Marvin Byer'49, Charles J. Belden'09, Joe Clary'96, James D. Cunningham, guest, F. W. DeFelice'40, Lawrence P. Geer'15, W. C. Gilman'22, David H. Hayden'99, R. D. Jackson'24, Archibald Kinghorn'20, George J. Leness'26, Leo Loeb'08, H. J. McGillivray'38, M. R. McKinley'19, M. J. Mackler'17, Tom Mason'25, Richard C. Mayer, guest, Charles G. Merrell'88, W. H. Mills'34, Walter N. Munroe'06, A. C. Redman'00, F. W. Stetson'15, Bill Upham'23, W. B. West'20, W. W. Zimmerman'42. — BENJAMIN L. SKINNER'42, *Secretary*, Post Office Box 157, Dunedin, Fla.

M.I.T. Association of Japan

E. Charlton Crocker'43, alumni representative to the Association, informs us that Masaru Kametani'25 has acknowledged receipt of four boxes of periodicals which were sent to the Association through the Smithsonian Institution, and goes on to tell of some past meetings and the new officers who have been elected. Honorary President: Randall J. Hogan'22; President: Masaru Kametani'25; Vice-president: Yoshinori Chatani'22; Secretary: John Kazuo Minami'31; and Associate Secretary: George Yamashiro'42. Twenty-five members attended a meeting on September 28 at the Pacific Citizen's Club in the Tokyo Kaikan Annex at which the above officers were elected. A new addition to the membership, Randall J. Hogan, Jr.'49, attended this meeting and is reported as working at the Central Exchange, Eighth Army, in Yokohama.

An October meeting was held at the Philippine Delegation House. It had been hoped that B. P. Abrera'32 would be with the members at this meeting as he was expected to leave Japan shortly thereafter. Unfortunately, because of a sudden call, Mr. Abrera had to leave a few days before the meeting took place. A November meeting was scheduled for the 16th at the Kojunsha Club on Ginza and it was planned to present Harry C. Kelly'36 with a souvenir for he, also, was expected to leave Japan. Dr. Kelly was the former honorary president of the Association. Other plans included a December meeting at the Industrial Club near Tokyo Station and tentative plans for a Sukiyaki party in January. — JOHN KAZUO MINAMI'31, *Secretary*, Waseda University, Edogawa Apt. 54, Shinogawacho, Shinjuku, Tokyo. GEORGE YAMASHIRO'42,

Associate Secretary, Scientific and Technical Division, ESS, GHQ, SCAP, A.P.O. 500, San Francisco, Calif.

The M.I.T. Club of New York

The Right Honorable Clarence D. Howe'07, Minister of Trade and Commerce for the Canadian Government, chose our Mid-Century Dinner for a very interesting speech on Canadian-American trade. A large turnout of several hundred Alumni and their wives attended this dinner at the Biltmore Hotel on December 6 and enjoyed speeches by Mr. Howe and President Killian. Toastmaster Charles E. Smith'00 presided and called on Jack Teeter'22 to introduce a Mid-Century fashion show put on by Lord and Taylor's stylists and models.

A time machine operated by a frantic professor produced costumes of 50 years ago and of today and nearly blew a fuse in bringing in the styles of 1999 as epitomized in a smartly dressed model complete with lap dog and "fireside" radio voice introduced as the president of the United States! The time machine also brought us Arthur Godfrey's sensational "Chordettes" singing old-time favorites in rich harmony. After the program, many lingered in the Fountain Room to continue the sociable evening and to compliment Jake Jakobson'21, Art Kemp'24, Jack Teeter'22, Tony Anable'20, Frank Kurtz'22, Dale Spoor'22, Chuck Springer'23, Ralph Wilts'41 and others on the committee on such a successful evening.

On Wednesday, February 15, the Club will hold a dinner meeting at its quarters at 115 East 40th Street. Class groups may have tables reserved ahead of time by contacting the chairman of the event, Ray Rundlett'22. A month later, the plans are set for a Spring Smoker. The membership chairman, Harvey Kram'42, is now offering a free information service: A telephone call to him at Evergreen 9-4500 is all that's needed to obtain a list of your classmates in New York — those who are club members. — G. P. GRANT, JR.'35, *Secretary*, Grant Photo Products, Inc., 401 Broadway, New York, N.Y.

Niagara Falls M.I.T. Club

On December 9, the Club held its Christmas meeting at the Niagara Falls Country Club. The officers for the next year were elected: E. C. Forbes'41, President; and John J. Seaman'35, Secretary-Treasurer. The remainder of the meeting was devoted to Christmas cheer and stories. This meeting marked the fourth for the season and shows a pronounced trend toward greater activity in the Niagara area. Also in this vein, L. White'12 and J. Neal'15 spoke of the Alumni Fund and

its success. — EDWARD D. KANE'47, *Secretary*, Ontario Paper Company, Ltd., Thorold, Ontario, Canada.

The M.I.T. Club of Oklahoma

The Club was greatly honored to have James R. Killian, Jr.'26 as its guest and speaker at a dinner meeting on December 8 at the Sky Terrace of the Tulsa Club. Thirty-four prominent Oklahomans attended as guests of the Club and the 53 Technology men present. Dr. Killian explained the role M.I.T. played in research and development during World War II and the urgency of the Mid-Century Development Program to bring its plant in line with the new responsibilities it must assume toward our country and toward rounded development of Technology men. Dr. Killian's talk was followed by a showing of the latest sound film of the Institute's various activities, and the evening closed with questions from the floor regarding M.I.T. problems and the Development Fund. The Club and its guests for the evening left with an intimate knowledge of the Institute and the wish that Dr. Killian may again visit us. B. E. Groenewold'25 has been elected president of the Tulsa chapter of Oil Well Drilling Contractors. — WALTER S. SMITH '31, *Secretary*, 410 McBirney Building, Tulsa 3, Okla.

M.I.T. Club of Philadelphia

We are happy to report that the Club now numbers 350 active members, the largest membership in our history. As nearly as we can tell, the M.I.T. Club is one of the largest active alumni groups in this area.

It is with regret that we note the passing of Roland G. E. Ullman'17. Mr. Ullman had been active in alumni affairs for many years, and at the time of his death he headed the Roland G. E. Ullman Advertising Agency.

Two members who appeared recently in the public press were Louisa J. Eskridge'39 and Pierre S. duPont, 3d,'33. A photograph of the attractive Miss Eskridge drew attention to an item relating that she was the principal speaker at a meeting of the League of Women Voters of Haverford Township. Miss Eskridge is secretary of the public health division of the Public Charities Association of Philadelphia. In case you missed it, Pete duPont was featured in a color photograph, in *Life* magazine modeling a pair of fashionable swimming trunks on the beach at Fisher's Island.

The next meeting of the Club will be on May 16, 1950 at the Barclay Hotel in Philadelphia. Reserve the date! It will be one of our best meetings. For information about Alumni in the Philadelphia-Wilmington area, telephone Boulevard 0287. — SAMUEL K. MCCAULEY'41, *Secretary*, 288 Copley Road, Upper Darby, Pa. *Assistant Secretaries*: WILEY F. CORL, JR., '39, Box 358, Bryn Mawr, Pa.; WILLIAM H. PEIRCE'46, 532 East Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.

The M.I.T. Club of Rochester

In a vote of appreciation for conduction of an outstanding picnic and steak roast, Vice-president Henry R. Couch'20 was elected president of the Club at the annual meeting on September 24. Gathering at Mendon Ponds Park, the Club spent an afternoon enjoying baseball, "touch," horseshoes, darts, and conversation—topped by an out-of-this-world steak dinner prepared by the committee. Chosen at the business meeting to head the Club for the year 1949–1950 were: President, Henry R. Couch'20; First Vice-president, Collin H. Alexander '39; and Second Vice-president, Stanley C. Wells'30. Re-elected were: Secretary, Frederick J. Kolb, Jr.'38; and Treasurer, Alfred E. Castle'40. Vernon E. Whitman'22 was picked for the executive committee to serve with Howard F. Carver'32 and Charles F. Payne'33 whose terms expire in 1950 and 1951, respectively.

Reporting to the Club on the M.I.T. Committee for Financing Development, Corporation member Edward S. Farrow '20 outlined the conviction of Rochester leaders that our campaign should be postponed to spring because of local conflicts and suggested that the Club take direction of the program rather than recruit a separate organization. Approval for this program was voted by club members. Dwight VandeVate'22 summarized the year's activities of the Scholarship Committee and reported on awards for Rochester area men entering the Class of 1953. Intense competition among the colleges for the top 10 per cent of the entering class now is making the committee's work more difficult, and this year over half the awards were declined by applicants who could not refuse more lucrative awards elsewhere.

The following members were present: Harold E. Akerly'10, Collin H. Alexander '39, Paul N. Anderson, Jr.'48, J. Cecil Aronson'22, Ernest L. Baxter'26, Malcolm A. Beers'47, Henry N. Bowes'44, Robert G. Bowie'38, Winton Brown'34, James S. Bruce'39, Alfred E. Castle'40, Henry R. Couch'20, Everett T. DeGuzzie'49, Charles A. Duboc'43, Raymond A. Dunn '43, William S. Edgerly'49, Evan A. Edwards'37, Harry E. Essley, Jr.'36, Edward S. Farrow'20, Nelson M. Fuller'23, Albert C. Gilbert'05, Howard S. Gleason, Jr.'43, Reynold A. Grammer, Jr.'47, John R. Green'46, Frederick J. Hopkinson'20, William N. Hosley'48, Stanley E. Jensen '48, Frederick J. Kolb, Jr.'38, Andrew Langdon'22, Harold H. Leary'23, David L. MacAdam'36, Kenneth J. Mackenzie '28, Arnold Mackintosh, Jr.'44, Howard E. Milius'38, Edmund H. Miller'23, William O. O'Neill'43, Roger W. Patterson '44, Charles F. Payne'33, Ralph W. Peters '30, David Richardson'37, Harold L. Smith, Jr.'39, Robert E. Smith'33, Winthrop M. Steele'39, George E. Stewart'48, Daniel E. Suter'38, Francis B. Thorne'27, Charles V. Townsend'49, Dwight VandeVate'22, Stanley C. Wells'30, Paul B. Wesson'98, Vernon E. Whitman'22, and Richard M. Wilson'30. — FREDERICK J. KOLB, JR.'38, *Secretary*, Building 14, Kodak Park, Rochester, N.Y.

M.I.T. Club of Schenectady

The Club gathered for a luncheon meeting at the Young Women's Christian Association at noon on November 22. Frank Brown'48, who was in charge of the meeting, introduced the speaker, Vincent J. Schaefer of the General Electric Research Laboratory. Dr. Schaefer, well known for his work in producing artificial weather conditions, is also an ardent student of Indian lore, on which subject he gave a very interesting talk. Describing the Mohawk Valley area as one extremely rich in material for study of archaeology, paleontology, and all forms of natural history, the speaker told of the past inhabitants of this section, from the earliest tribes down to the Algonquin and the Iroquois. He went on to tell of the methods used in locating Indian camp sites, and in excavating and classifying the material found in the area. The meeting was then opened for the usual question and answer period.

Present were: W. D. Coolidge'96, R. C. Robinson'01, Nathaniel Sprague, Jr., '02, Robert Palmer'04, P. M. Currier'14, E. H. Bancker'18, F. F. Buckland'20, H. H. Zornig'23, W. O. Bachli'33, C. F. Barrett, Jr.'34, C. C. Wetmore'37, A. H. Chestnut'39, D. C. Jackson, 3d,'40, I. W. Collins'41, G. M. Ketchum'41, J. H. Macleod'41, R. H. Simon'41, R. W. Stanhouse'41, R. W. Austin'42, E. B. Judd'42, W. B. Rodeman'44, J. G. Holmes'47, E. S. Lawrence'47, J. F. Robertson, Jr.'47, A. M. Varner'47, F. Brown, Jr.'48, and T. J. E. Glasson'48. — IVOR W. COLLINS '41, *Secretary*, General Electric Company Building 273 E-212, 1 River Road, Schenectady 5, N.Y.

Washington Society of the M.I.T.

On December 8, the Society had its second meeting of the current season. Secretary of Labor, Maurice J. Tobin, gave us an interesting informal talk on the labor situation. He outlined some of the historical developments which have led to such things as the Federal Social Security Program, the Wagner Act, and the government's current policies in dealing with labor. About 70 persons attended this informative meeting and vigorously participated in the question and answer period following the Secretary's talk.

Our next meeting was scheduled to be held at the Willard Hotel on January 12. This was our annual stag night and all M.I.T. Alumni in the Washington area were cordially invited to attend. Ernest L. Blanche, author of the book, *You Can't Win*, was our speaker. — JOHN ADE PLUGGE'29, *Secretary*, 35 Oxford Street, Chevy Chase 15, Md. ALBERT F. BIRD'30, *Review Secretary*, 5070 Temple Hills Road, Southeast, Washington 20, D.C. JOHN W. SHEETZ'42, *Assistant Review Secretary*, 3068 South Woodward, Fairlington, Arlington, Va.

M.I.T. Women's Association

The annual Ellen Richards Memorial Meeting was held in the Emma Rogers Room on December 7. Sixty members and

guests attended the supper. Included among the guests were Julius A., and Mrs. Stratton '23; Mrs. Margaret Alvord, house-mother at the women's dormitory; and the present women students. Many of the 1949 graduates were also in attendance. A gift of cups and saucers for the Margaret Cheney Room was presented to the women students. Dr. Stratton, Provost of the Institute, was the speaker of the evening. He traced the development of M.I.T. since the early 20's, stressing the more recent events and telling some of the future plans. At the conclusion of Dr. Stratton's talk, a discussion period was held with most of the members remaining to participate. — MADELINE I. ANDERSON '31, *Secretary*, 1251 Commonwealth Avenue, Allston 34, Mass.

CLASS NOTES

• 1886 •

The Secretary has in his file the names and addresses of twenty-seven '86 Alumni (including M.I.T. and S.M.A.) given to him by the Alumni Secretary when he took over after the death of Arthur Robbins in 1947. During the period ending December, 1949, two deaths, those of Charles H. Herrick, Secretary of S.M.A. '86, and Fred A. Whitney, have occurred. Before his death, Mr. Herrick sent in the names and addresses of three more living S.M.A. '86 men, one of whom, Ambrose Walker of Winter Park, Fla., and Salem, Mass., returned to the M.I.T. for architectural study and is listed in the alumni records as '91. I have removed his name from my '86 list in order that our records might agree. Of the 27 remaining '86 men to whom the original notice of the change in secretaryship was sent in December, 1947, 14 have responded to the 1949 assessment of \$1 dues for postage and so on, leaving 13 to be heard from. The receipts and payments for the year ending December 31, 1949, are as follows: Balance, January 1, 1949, \$8.48; Receipts, \$27; Total, \$35.48. Payments: Council meetings, \$12; Mimeographing, \$6; Postage and stationery, \$2.93; Total, \$20.93. Balance, December 31, 1949, \$14.55. If the delinquents would send their dollar dues to the Secretary, probably no assessment would be needed for 1950.

The suggestion about a possible '86 class gift to the Alumni Fund has not met with favorable reaction; only five or six members have been interested enough to reply and their answers have all been in the negative. Unless more replies are received or other plans suggested, the matter will be dropped where it began. — The Secretary has not forgotten his idea of looking up the publications of '86 men included in the card catalogue of the M.I.T. Library, but up to the present there has been no adequate opportunity. If the membership would let him know if the idea would be of interest, it might hasten matters! — A notice was received

from Maurice H. Howe that his father, Benjamin M. Howe, S.M.A. '86, passed away on December 19. No other information is available at the present time. — ARTHUR T. CHASE, *Secretary*, Post Office Box 4, Island Creek, Mass.

• 1891 •

The Secretary is pleased to report that he has received the archives of the great M.I.T. Class of 1891, which have been carefully collected and preserved by our esteemed Secretary, Henry Fiske. These include records of class meetings, replies to questionnaires, snapshot pictures taken at class outings, clippings from publications and copies of address books and of the books published at each succeeding 10th anniversary. Since receiving this interesting collection, Gorham Dana has made a very substantial contribution from his personal files which includes cabinet size photographs of many of our members, taken at the time of graduation, and many snapshot pictures all of which I am sure will be very interesting at some future gathering.

A letter from our class representative in Pittsfield, Mass., Arthur W. Pierce, encloses a clipping from *The Pittsfield Work News*, with a good picture of this young man on his bicycle, with a record of 5,100 miles since September 1947. "Arthur W. Pierce has owned five bicycles in all since he purchased his first wheel in 1895. Years before, he used his bicycle for longer trips, but the present bike carries him only around the city on his many errands and to the various clubs that he attends. Every Tuesday afternoon there's a meeting of the Golden Age Club and on Monday and Thursday afternoons the GE pensioners meet at the Stanley Club to play chess, pool and cards. Mr. Pierce is also very active in Boy Scout work and serves now as assistant scoutmaster of Troop 14. As president of the Pensioners Club, a post which he has held for nearly nine years, he has many duties to perform. . . . Mr. Pierce, who retired as a requisition engineer in the Power Transformer Engineering Division in 1932 after 28 years of service, has missed only five days of bike riding since the first of the year, and this has been due to poor weather." I am sure we all join in saying "more power to him." — We wish to report the following changes in addresses. Edward R. Wait, 22 Temple Street, Boston 14. Charles H. Clark, Hotel Continental, 25 Garden Street, Cambridge 38. Robert C. Spencer, Box 599, Tuscon, Arizona. Horace L. Brand, 1448 South Wabash Avenue, Chicago 5, Ill.

It is with regret that we have to report the passing of three more of our members who have been a credit to M.I.T. and the Class of 1891. The following notices appeared in the papers. "Thomas Means Keene, 79, former senior Highway engineer in Massachusetts for the U.S. Public Roads Administration, died . . . , November 5th, at his home, 70 Coolidge Street, Brookline, after a two months illness. Mr. Keene was born in Chelsea, and was graduated from . . . Technology in 1891. He served in Cuba as a United States Highway engineer dur-

ing the American Occupation after the Spanish-American War. He was in Montana and Oregon for the Public Roads Administration before coming to Massachusetts. He was a member of the Oakley Country Club. Mr. Keene leaves his wife, the former Edith Shaukland, a daughter, Mrs. H. F. Spang of Watertown, two sons, Philip, of Middletown, Conn., and Richard, of Wellesley Hills, and eight grandchildren. Funeral services and interment will be at Augusta, Maine."

"Dr. Dixie Lee Bryant, 87, of 19 Mt. Vernon Circle, retired educator, died . . . November 18th in an Asheville hospital, following a lengthy illness. A native of Louisville, Ky., Dr. Bryant came to Asheville in 1931 following her retirement as a teacher in the public school system of Chicago, Ill. Born January 7, 1862, she moved with her family to Columbia, Tenn., in 1868, where she attended Columbia Female Institute. Dr. Bryant taught first in an ungraded country school in Culleoka, Tenn., and later in Hamilton College, a girls' finishing school at Lexington, Ky. In October 1887, she entered . . . Technology at Boston where she specialized in mineralogy. She graduated in 1891 with a B.S. degree. Dr. Bryant went to State Normal and Industrial School at Greensboro when it opened in October, 1892. She was instrumental in the establishment of laboratories in chemistry, biology and physics. She resigned after nine years at the school, in order to undertake further study. Going to Germany in 1901, she studied microscopical petrography in Heidelberg with Rosenbusch. Later she went to Erlangen, Bavaria, continuing that subject with Widemann and botany with Professor Colerader. She received the doctorate in 1904. She was an honorary member of Delta Kappa Gamma sorority and for 59 years was a member of the American Association of University Women. She was paid tribute by the latter organization during its Southern Atlantic Regional Conference here last year."

"George D. Rogers, 81, well known shipping firm executive in Boston for 32 years, died . . . December 6th, at his home, 147 Winthrop Road, Brookline. . . . Born in Rockport, the son of the late Charles S. and Martha Ann Nichols Rogers, both members of old Rockport families, Mr. Rogers was educated at Gov. Dummer Academy and was graduated from . . . Technology in 1891. He started his shipping industry career around the barges of the Rockport Granite Company, founded by his father. In 1908 he founded the firm of Rogers and Webb shipping company, and was senior partner of the firm at his retirement in 1940, on account of ill health. The firm started by handling 28 coastal schooners, and during World War I served as a Boston agent for the U.S. Shipping Board. Between wars the firm represented several shipping lines at various times. Mr. Rogers was a charter member of the Boston Marine Society. He leaves two brothers, Louis A. of Rockport, and Arthur S. Rogers of Omaha, Neb. . . ." — FRANK W. HOWARD, *Secretary*, Post Office Box 147, Watertown 72, Mass.

• 1892 •

The Secretary has not much news at the present time. Carlson reports that he was on his way to Florida the first of the year; that he called on John Hall a short time ago and found him considerably improved from the after effects of his operation last spring. Our President, George Ingraham, is well and expects to spend the winter at his home in Marblehead. Dr. Worthington and Arthur Ober are well and active. Harry Burnham, also, is going strong. Fairfield is still active in his insurance business and was planning a trip to Arizona. I have not heard from Charles Chase recently, but assume that he is still pursuing his activities. I expect that by now, Channing Wells is at his winter residence in Palm Springs. — CHARLES E. FULLER, *Secretary*, Box 144, Wellesley 81, Mass.

• 1893 •

A letter received recently from Miss Araksy Torossian from Sofia, Bulgaria, dated November 14, informs us that her father, who had been seriously ill for some time, passed away before the arrival of the two packages of clothing and food-stuff donated by our Class. Miss Torossian stated that it caused her father great joy to know that he was being so well remembered by his classmates; and, although he did not live to enjoy the presents personally, the family is very grateful for what was sent and extend their regards and thanks to the Class. — FREDERIC H. KEYES, *Secretary*, Room 5-213, M.I.T., Cambridge 39, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, 38 Chauncey Street, Boston 11, Mass.

• 1894 •

Samuel Henry Blake, born in Abington, Mass., was graduated with our Class after an active career in undergraduate affairs. In July, 1899, he entered the employ of the General Incandescent Arc Light Company in New York; in 1903 he became an engineer in the arc lamp department and was placed in charge of the Southside Works of the General Electric Company at Pittsfield. Ten years later, in July, 1913, Mr. Blake was transferred to Schenectady as engineer of the supply department. After another ten-year period, in November, 1923, he joined the staff of F. C. Pratt, then vice-president in charge of engineering. Here, in 1927, he became chairman of the General Electric Standardizing Committee and of the Committee on Mechanical Design.

In this position, for the next 15 years, Mr. Blake served as an arbiter in the settlement of many difficult and important technical problems, and guided the preparation of the Standard Engineering Practice Letters, which formed the rules of General Electric engineering procedure. In 1941, the Standardizing Committee was replaced by a number of separate product committees who were responsible for setting objectives and preparing specifications for the development of new and improved apparatus, with Mr. Blake remaining as general chairman.

Shortly before his retirement in 1942, Mr. Blake wrote an article entitled, "A Technical Committee System," appearing in the August, 1942, *General Electric Review*, in which he described the evolution of the unique technical committee system of General Electric for whose development he was largely responsible. In addition to his other duties, Mr. Blake was also a member of the boards of directors of the Warren Telechron Company at Ashland, Mass., and the General Electric X-Ray Corporation at Chicago, both General Electric affiliates. He was a Fellow of the American Institute of Electrical Engineers and a member of the Mohawk Golf Club. He died in Schenectady, N.Y., on August 24, 1948. For many years, he lived at 829 Union Street, Schenectady, where Mrs. Blake continues to make her home. — SAMUEL C. PRESCOTT, *Secretary*, Room 5-213, M.I.T., Cambridge 39, Mass.

• 1896 •

The Secretaries acknowledge payment of several class dues and, also, notes accompanying them. Bradley Stoughton sent best wishes for Christmas and for increasing prosperity for 1950. He hopes to be in New York for the class reunion. Dan Bates says, "It is good to see the class notes from month to month in *The Review* and to be in touch in that way; although, I wish we could see one another oftener." Our sincere thanks for all other Christmas and holiday greetings.

We have been notified of the death of Clement B. Tower of Concord, Mass. A note of sympathy has been sent to Mrs. Elizabeth Tower. — JOHN A. ROCKWELL, *Secretary*, 24 Garden Street, Cambridge 38, Mass. FREDERICK W. DAMON, *Assistant Secretary*, 275 Broadway, Arlington 74, Mass.

• 1897 •

Frederick L. Edmonds, II, died suddenly at Newtonville, Mass., on October 27 while hurrying to board a train for Boston. Upon graduating, he became an assistant examiner in the United States Patent Office in Washington. In 1903, he graduated from the Columbia University Law School with the degree of Master of Patent Law. He was connected with the patent department of the United Shoe Machinery Corporation for 46 years, and at the time of his death was foreign patents attorney for that company. He leaves a wife, one son and one daughter, also a brother and a sister.

Wilfred Bancroft has advised your Secretary that William W. Eaton, II, died suddenly in Philadelphia on November 29 at the age of 74. He seemed to be in excellent health and was driving home from work at the Lanston Monotype Machine Company when his companion noticed that he had suddenly collapsed. He was taken to the University of Pennsylvania Hospital, which was nearby, and placed in an oxygen tent but he never regained consciousness. He had been with the Lanston Monotype Machine Company for many years, and at the time of his death was superintendent of the drawing room. He leaves a wife, one son and one daughter, also a brother and a sister.

From the *Engineering News-Record* of November 10, we are pleased to quote as follows: "The ASCE [American Society of Civil Engineers] Board of Direction last week named five honorary members — highest individual honor within the gift of the society — for presentation at the annual meeting in New York in January. . . . Charles B. Breed, railroad engineering specialist and consulting engineer of Boston, one of the nation's outstanding experts on grade-crossing elimination work, until 1944 head of M.I.T.'s civil engineering department. . . ." We all congratulate Charlie on this high honor paid to him by the A.S.C.E. He makes his summer home at "Seamew," Harbor Road, Camden, Maine, and has a winter residence at Newtonville, Mass. He still maintains a consulting engineer's office in Boston and New York City.

No doubt all '97 men read with interest the series of articles on the Du Pont Company and family that appeared in the issues of the *Saturday Evening Post* during October and November of 1949, and marvelled, as did your Secretary, at the excellent pictures of Irene. We would all like to know how he keeps from showing his age. Possibly, it is his annual winter sojourn in Cuba with his daily rounds of golf that enable him to keep that healthful appearance of middle age. Perhaps the Du Pont Company has developed some youth-preserving serum that is responsible for it all. Guess we'll have to look into this. — JOHN A. COLLINS, Jr., *Secretary*, 20 Quincy Street, Lawrence, Mass.

• 1898 •

The editorial boards, mentioned in previous issues of *The Review*, have not yet begun to function, although there has been considerable behind the scene activities. It requires time for a new idea to take root and to bear fruit. In the meantime, we will again take up the pen. — George Anthony writes that he is moving from Detroit to a new home in Ohio. How come, Tony, you could leave your beloved Detroit? Write us a breezy letter, telling us all about it and about the new home in Ohio, and not forgetting the lovely lake and summer home in the woods of Northern Michigan.

Before you read these notes, you will doubtless have received through the kindness of our original classmate, Roger Babson, a description of certain aspects of the program of the Babson Gravity Research Foundation. Apropos of gravity research, we recently glimpsed in the office of the chief chemist of a large textile organization, the following plaque: At the top of the plaque was a picture of a bumblebee alighting on a large blossom and beneath was the legend, "The Bumblebee Cannot Fly." According to the theory of aerodynamics and, as can be readily demonstrated through laboratory tests and wind tunnel experiments, the bumblebee is unable to fly. This is because the size, weight and shape of his body in relation to the total wing spread makes flying impossible. But — the bumblebee, being ignorant of these profound scientific truths, goes ahead and flies and manages to make a little honey every day!

A lovely card from the Blanchards at Lake Alfred, Fla., shows the brilliant flame vine (*Bignonia Ventusa*) in full bloom. This card gives us a nostalgic remembrance of our trip to Florida last winter, for at that time the flame vine was in bloom, making bright patches of color on buildings, trees, and hedges. We remember, in particular, one hedge of flame vine, that ran on two sides of an estate, equal in extent to a good sized city block.

Henrietta and Howard Bodwell from far California have sent a unique card: on a blue mixed with green ground, several giant cacti (*saguaro*) stand out prominently and, in the background, a white topped mountain range. Howard writes in part: "We had a very pleasant, but very short visit with Arthur and Mrs. Blanchard one day last summer. We were surely glad to see them. It was great to see Arthur looking so well. I see by your last class news that they got back to Boston all right. We called on Frank Colcord and Mrs. Colcord one day at their home in San Marino and had a most enjoyable visit with them. They both looked first rate. Give my regards to any of the '98 fellows that you may see."

Ernest Bragg called at the office the other day and we had a regular cordial '98 get-together. Ernest is quite a writer. In earlier columns of the class news, we described the pamphlet, *A History of Methodism in Milford, Mass.* He has since written and published a book of 141 pages under the caption, *Granite—Its Formation, Elevation, Exposure and the Development of the Granite Industry in Milford, Mass.* Ernest states that he is preparing a book on the boot and shoe industry, which since 1793 has flourished in and about Milford. According to his researches, his own great-grandfather, turning from custom shoemaking, was the first man in the new United States to embark in the wholesale manufacture of boots and shoes. In his original venture, he procured tools valued at \$2.50, four calfskins valued at \$7, and some sole leather of value unknown. From these he manufactured 22 pairs of shoes which he took on horseback to Providence and sold for \$21.50. That's exorbitant profits for you! We wonder why the attorney general, Edmund Randolph, did not get after him. And, by the way, in the course of this call, we talked with Vernon D. Tate, Director of Libraries at M.I.T., and learned that he is making a special collection of books written by M.I.T. Alumni, to be separately housed in the new library. Ye authors of '98, take notice!

The Secretary and his sister have moved from Boston to 2 Gregory Street, Marblehead, Mass. After living in one place in Boston for 20 years it was quite a chore; but we are now pretty well settled in the new home and would be pleased to welcome all '98 friends. — Dan Edgerly was in Boston in November and we had a two-hour visit in his room at the Parker House. Dan has continued his intensive work on class affairs and, in particular, has worked out a series of studies relating to the Alumni Fund, '98 Capital Gift Fund, bequests and also curricula and operations at M.I.T., all of

which will be available in due course to all the members of the Class. — Fred Gilbert from Helena, Mont., writes that he has recently been elected president of the Montana Society of Engineers. Congratulations, Fred. Hurrah for the miners' union!

Presidential letter number three has brought several interesting replies. One classmate telephoned long distance and advised that he was sending \$100 for the '98 Capital Gift Fund. This, we will remark, is additional to a generous contribution to the fund prior to the Golden Anniversary. He writes: "It seems to me that the design of the fund might recommend itself to younger classes as a means of establishing through relatively small beginnings an eventual contributing source of generous size." Writes another classmate: "For your information I wrote a new will a year ago, leaving the M.I.T. \$1,000. Good causes can be aided in this sure and simple way by many small bequests." Writes another classmate: "Your good letter number three of November 2 was welcome. You will be glad to know I have been able to make a further change in my will so that the probable legacy to the Institute will be about double that which I reported to Ed Chapin at our 50th reunion." The amount reported at the 50th reunion was \$15,000. Double this, \$30,000! Classmates will be interested to note that the present expectancy of the '98 Capital Gift Fund based on cash actually paid in, securities donated, pledges and bequests, is slightly in excess of \$100,000.

There has been some confusion as to the relationship of the '98 Capital Gift Fund and the Development Program, and as to which fund to send contributions during the coming year. This was taken up with the proper authorities of the Development Program and M.I.T. and the results reported in a recent class agent letter. To recapitulate briefly: All contributions this year of cash and securities should go to the Development Program; all bequests to the '98 Capital Gift Fund. If it is a question of a present cash contribution or a future participation in a will, make, if possible, the cash contribution, because of the present insistent need, as President Killian has expressed it, "to fund M.I.T.'s independence."

Arthur Goodrich writes that he has moved and that his new address is Box 301, Cathedral City, Calif. What was the matter with the Mesa, Arthur? We gathered from your pre-golden letter that the Mesa was an attractive place, with an unusually low cost of living!

Other new addresses are as follows: Rev. Donald N. Alexander, 20 Catherine Street, Worcester, Mass.; Roger W. Babson, Mountain Lakes, Lake Wales, Fla.; Willis L. Learned, Brentwood, Exeter 1, N.H.; Benson B. Priest, 1328 High Street, Williamsport, Pa. — EDWARD S. CHAPIN, Secretary, 463 Commercial Street, Boston, Mass. JOSEPH C. RILEY, Assistant Secretary, 9 Pond View Avenue, Jamaica Plain, Mass.

• 1899 •

William Stark Newell received on November 11 a gold medal as a joint special award from the American Society of Na-

val Engineers and the Society of Naval Architects and Marine Engineers, at the annual banquet of the latter society. The medal was awarded for "illustrious and devoted service to his profession, his country and his fellow man." What a man! Congratulations, Stark.

According to a clipping from the New York Times of December 9, Raymond F. Bennett died on that date in Portland, Maine. His professional achievements in deep water engineering work were chronicled in this column only a few months ago. — Notice has been received of the death of Ross Hasbrouck on September 30 at his home in Poughkeepsie. No further details are available at this time of writing.

Ralph H. Pinkham of Evanston, Ill., is in Ft. Lauderdale, Fla., at 712 Southeast 7th Street, for the winter. Lucky guy. — BURT R. RICKARDS, Secretary, 381 State Street, Albany, N.Y. MILES S. RICHMOND, Assistant Secretary, 201 Devonshire Street, Boston 10, Mass.

• 1900 •

We can now say definitely that our Golden Fiftieth Reunion will be held at the Lighthouse Inn, West Dennis, Mass., June 9 to June 12, 1950. We believe that all will be pleased with our choice of a meeting place. We particularly wanted to find a suitable place on the Cape as this seemed to be the first choice of everyone. West Dennis is about seven miles east of Hyannis and only about the same distance farther from Boston than Osterville, where we have been before. The Lighthouse Inn is located right on the ocean with a 700-foot swimming beach of its own — an advantage we have not had before. There is a main building close to the water containing the lobby, living rooms and a dining room overlooking Nantucket Sound. Around this building are numerous guest houses, some overlooking the sea and others directly on the water front. All have private baths and fireplaces. There is a tennis court in the rear and a shuffleboard and pavilion are at the water's edge.

Our program for the entire reunion has not yet been fully developed, but the Class will be expected to be present at Class Day exercises on Thursday, June 8 and at the graduation exercises on Friday. Other events will, undoubtedly, be scheduled for these days. Friday afternoon we will go to the Lighthouse Inn where we will remain until Monday morning. These two days and three evenings will be occupied largely in meeting old friends and enjoying the renewal of old acquaintances. Saturday evening we will have our usual class meeting. Other events will also be arranged for these days, perhaps including a clambake. Monday, June 12, will be Alumni Day and we will wish to leave West Dennis early in order to be at the Institute in time for lunch in Du Pont Court. The program for Alumni Day is not yet fully developed but it will surely be interesting. The usual Alumni Banquet will be at the Copley Plaza on Monday evening and we will be expected to be there in full force. Our class gift will be announced at this dinner. You have

already heard from Charlie Smith about this gift. With the start that Charlie has already made we anticipate that our gift will be one of which we can be proud.

It is very important that we soon have some approximate idea of how many will come to our reunion. If you have any thought that you may be able to come, please drop a line to the Secretary so informing him. This will help us in making our plans and the publishing of these names in the class notes may be an incentive to some of your friends to come, also. Everyone, please write at once. — ELBERT G. ALLEN, *Secretary*, 54 Bonad Road, West Newton 65, Mass.

• 1901 •

Much of the material for these notes has been sent to me by Mrs. Peterson who has kept in touch with many of the Class and receives frequent letters from them. William Sturtevant, who was reported in the December notes as having retired, has informed me that the report is in error and he is still on the job. Albert Galusha is still with the Wellman Engineering Company in New York. Charlie Tufts has retired, living in New York but spends some of the cold-weather season in Florida. Eloise Derby, who was registered as deceased, is apparently very much alive and is located in Paris, France. Greta Gray has retired from her work in the University of California and is living in Palm Desert in that state. Alexander H. B. Jeffords, who was with the Trundle Engineering Company in Cleveland, Ohio, is enjoying a retired existence in Miami, Fla. Charles M. Culp, who is a certified public accountant in Seattle, Wash., sends a letter with a card enclosed. He writes: "I am now the oldest member of my profession in this state in active practice. As you will note by the seasonal card, I am a widower and live alone in my house which is in a residential district exclusively."

The following interesting letter comes from Edwin Church who has been teaching in the Brooklyn Polytechnic Institute for many years: "I am looking forward to attending the reunion in 1951, and intend to be there if I possibly can. Regarding my activities for the class notes, I really have nothing of much interest that has not already been given. I retired from full-time teaching in 1946 and have been keeping up two graduate classes since then in fields of my greatest interest, steam and gas turbines. I wrote a book 15 or 20 years ago on steam turbines; for the past year and a half I have been putting my spare time into a rewriting of the book. I have been on one committee or another of the American Society of Mechanical Engineers for over 25 years and in some of them was very active. For many years I used to meet Sweetser, a member of 1901 from Maine, and we would have lunch or dinner together. He died a number of years ago. No one of my Class (so far as I know) is active in A.S.M.E. work just now. I am glad that Taft is class secretary. He is another of my classmates who went into teaching work and it happened to be in my line too — mechanical engineering. As to recreation, I grow some roses and other flowers in a

small way. I am also fond of getting around these United States by auto and seeing all that I can of them. I have not done as much as I would like in this line for various reasons."

Anna Gallup, who was curator-in-chief in the Children's Museum in Brooklyn, has retired to Mystic, Conn. She reports: "I was recently called to Brooklyn, N.Y., to participate in the 50th anniversary of the founding of the Children's Museum. It was the first in the world. No such thing as a children's museum had been thought of when I began the work. Today no conference of museums occurs without a section devoted to children. There are many children's museums. An international organization has its headquarters in Paris, France. There has been one conference in Mexico City and a second conference will be in London next summer. Brooklyn is going to have a new children's museum building to cost \$1,600,000 and to constitute one building in the "Educational Center" which is projected for the Brooklyn Institute of Arts and Sciences. The Children's Museum is scheduled to be finished in two years. I worked very hard to develop my own institution and to get a new building for which plans were drawn; but now I see I didn't have the right idea — I worked for an institution, but I was involved in a *movement* and didn't realize it until one lifetime of service was almost over."

Phil Moore has written me interesting news concerning Arthur Hayden: "Not so very long ago Mrs. Peterson told me that Arthur Hayden was staying at Oxford, Md. I frequently spend some time at Easton not far from Oxford. I was down there in November and got in touch with Arthur and we had a delightful luncheon together. I don't suppose I have seen him since graduation but there was no difficulty at all in recognizing our classmate of 50 years ago. He is a great swimmer and enjoys canoeing and he has followed those two recreations very thoroughly in the territory surrounding Easton and Oxford. He has done almost all the creeks and rivers in which that country abounds; I might say lengthwise in a canoe and crosswise in swimming because one of the rivers he swims is plenty wide but he enjoys doing it. In his career as engineer for the Bronx River Parkway Commission, he did some very interesting work on structures for overpasses which economized in material and in the volume of soil that had to be moved in any given case. He devised what is described as the rigid frame bridge which became so famous and well known that engineers came from all over the world to work in his office and learn about it. A book which he has written about it is in the third edition. I hope to see him in that part of the country again next spring. Arthur's family of two boys and a girl have done well by him in the matter of grandchildren of which he has 10. This impels me to add my own little bit that my 13th arrived at New Haven, Conn., last month making nine granddaughters and four grandsons."

Phil also sends me the following: "Honored — Wilford Willis DeBerard, city engineer for Chicago and formerly of Wilmette, will receive an honorary mem-

bership in the American Society of Civil Engineers at the group's annual meeting in New York City in January. After receiving his education at Beloit College and M.I.T., he began his career as chemist and bacteriologist for the Denver Union Water Company. He has been affiliated with other municipalities including Philadelphia, Harrisburg, Columbus, Oakland, New York City and Chicago. He was western editor of the *Engineering News-Record* for more than 30 years. In Wilmette he was a village trustee from 1925 to 1927 and again from 1930 to 1932. Fraternal affiliations include directorship of American Society of Civil Engineers, membership in the Western Society of Engineers, American Association of Engineers, honorary membership in the American Water Works Association, membership in Theta Delta Chi and Phi Kappa Psi fraternities."

You will be interested in the following concerning Al Higgins: "Conducting 91 leading utility financiers and analysts on one of the most interesting, informative and goodwill building tours ever arranged by a utility, Florida Power's President A. W. Higgins last week revealed the important role his company is playing in Florida's aggressive West Coast agricultural and industrial expansion. Commended by State and local government officials, including Governor Fuller Warren who voiced high praise for Florida Power's good service at low rates, Higgins announced a large construction program to keep pace with Florida's growing population."

I have the following notice from Bob Williams regarding the 50th reunion: "I have checked our address list with the Alumni Association file and also with some of the Class whose addresses were in doubt. I find we have 201 members who are still alive, a very good number after all these years. At the time of this writing, we have a tentative reservation at the Oyster Harbors Club for the reunion on June 9 and 10, 1951. By the time you read this, we hope to have a definite reservation there or somewhere else. In the meantime, you will have received a questionnaire to assist us in making plans. A list of committees with their members has been prepared."

The annual class letter will go out sometime this month. I hope that all of you will not only return the data sheet with your class dues but will tell something of what you are doing. How do you occupy your time? What are your hobbies? Items which you may think are not worth telling about are really of much interest to the Class. Put something in the news section. — THEODORE H. TAFT, *Secretary*, Room 3-282, M.I.T., Cambridge 39, Mass. WILLARD W. DOW, *Assistant Secretary*, 287 Oakland Street, Wellesley Hills 82, Mass.

• 1902 •

Our Class has lost two of its members since the last class notes were written; Henry Manley, Jr., and Walter Wellman. Manley passed away at White Plains, N.Y., after a long illness, on October 26, 1949. He was born on October 13, 1880,

in West Roxbury where he spent all his youth. After graduating from English High School, Boston, he entered M.I.T. in the fall of 1898. It was his life-long regret that ill health forced him leaving before graduation and he always took a great interest in the Institute's progress. For many years, until his retirement from active business, he was a member of the M.I.T. Club of New York and of the American Society of Civil Engineers. After leaving the Institute, for several years his health forced him to take various outdoor engineering jobs throughout the United States. In 1912 he commenced work with the Public Service Commission of New York, spending most of his time on the construction of what is now the Flushing Branch of the I.R.T. From 1919 to 1924 he was connected with the firm of Lockwood Greene and Company after which he opened his own office in New York City as a consulting engineer specializing in industrial construction. Among the various construction projects he handled were the Procter and Gamble factories at Baltimore, Md., and Quincy, Mass. His father was one of the founders of the Boston Society of Civil Engineers and was for many years one of its directors. Henry Manley is survived by his wife, Louise Hinde Manley, and two children, Henry, 3d, and Mrs. Russell W. Brown.

Wellman's death occurred on November 13, 1949, at Montvale, N.J., according to information received from the Alumni Office. While Wellman was a graduate of Course IV he did not follow the profession of architecture but turned his hands to cartoons where his native sense of humor and skill as an artist won him success in his chosen vocation. Regrettably, he was never able to get to our reunions and many of us lost touch with him.

Retirements seem to be in order among the members of our Class. Bert Sherman retired from active participation in the firm of Skinner and Sherman, Inc., on November 1, although he still remains as a vice-president and director. Sherman was one of the original founders of the firm in 1921 and was treasurer until the business was acquired last June by the New England Spectrochemical Laboratories. — Grant Taylor retired this fall after long association with the Turner Construction Company. Grant has been in engineering since graduation in 1904. His first job was with the Kosmos Engineering Company, contractors for the masonry anchorage at the Brooklyn end of the Manhattan Bridge. This great mass of concrete and granite required more than four years for construction. Grant's service with the Kosmos Engineering Company and affiliated interests lasted until 1910, and included detail work in connection with the building of the long length of reinforced concrete retaining wall parallel to the railroad tracks at St. George, Staten Island. From 1910 until 1912, he worked on details and design for reinforced concrete with several employers, principally Truscon Steel Company and Corrugated Bar Company. In the late summer of 1912, connection with the Turner Construction Company was

made, with assignment to a project just getting under way, two buildings at Niagara Falls for Carborundum Company. A transfer was made in January 1913 to another Turner Company project at Baltimore, and a few months later another transfer to the estimating department at New York. Since that year, his work has been on estimates and allied matters; in New York until 1919, and thereafter in Boston. Grant and Mrs. Taylor will continue to make their home where they have lived since their marriage in 1928.

Plans for our "50th" must soon be started and an expression of choice for the place of meeting would be appreciated by your officers. Should we meet near Cambridge or on the Cape? Make your choice known, please. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston 16, Mass.

• 1903 •

It is our sad duty to report to the class the death of one of its most notable members, Frank Baldwin Jewett, VI. Dr. Jewett was graduated from Throop Polytechnical Institute, now the California Institute of Technology, and after winning his doctorate at the University of Chicago in 1902, came to the Institute as an instructor in Physics and Electrical Engineering and was affiliated with our Class. He joined the American Telephone and Telegraph in 1904 and was put in charge of the company's engineering department in 1907. We are indebted to the *Newark Evening News* for the following: "Dr. Jewett was named vice president of A.T. & T. and president of Bell Laboratories in 1935. He resigned his post as president of the Laboratories in 1940 to become chairman of the board and retired from the latter post upon reaching the retirement age of 65 in 1944, when he also retired as vice president of A.T. & T." During this period, "he helped develop long distance telephone communication then in its infancy, and directed work which resulted in phantom loading, loading of large-gauge and open-wire circuits, the practical use of telephone amplifiers on loaded lines and phantom duplex cables."

During World War I, he served as a lieutenant colonel in the Signal Corps in 1917. He was also advisory member of a special submarine board, U.S.N., and a member of various commissions of the National Research Council. He received numerous academic and governmental honors, one of the last being the 1949 Hoover Medal, one of the highest honors in the engineering profession, given "by engineers to a fellow engineer for distinguished public service." At the time he died, November 18, he was a trustee of the Carnegie Institution of Washington, a life member of the M.I.T. Corporation, and a fellow and past president of the American Institute of Electrical Engineers. He was a former president of the Alumni Association. In 1930, he was designated as "one of the ten men the world could least afford to lose." Born in Pasadena, Calif., on September 5, 1879, he died in Short Hills, N.J., following an operation. He leaves two sons, a sister and three grandchildren.

From the *Philadelphia News*, we read of J. Howard Pew, II: "Outstanding achievement in any field is deserving of recognition and the decision to award J. Howard Pew director of the Sun Oil Co., the American Petroleum Institute's gold medal is a mark of such recognition, an honor that unquestionably is being well conferred. Mr. Pew has been a recognized leader not only in the oil business, but also in other industrial, social and philanthropic fields. The Petroleum Institute's award puts him in distinguished company, for the only other similar awards were made to Henry Ford, Dr. William Burton and Dr. Charles F. Kettering. Mr. Pew's contribution to the development of the constantly growing petroleum industry has been great and he is still the guiding force in the creation of new engineering methods for the Sun Oil Co. His award is on the basis of his contribution to the public welfare. It is well deserved."

A short letter from A. B. Allen, II, retired and now living in Cranford, N.J., reports that his wife died last spring. Our sympathy to him, and our best wishes for his own health, together with the hope that he will be at the next gathering of the Class. — A longer letter from John Nolan tells of his travels in Kentucky and Virginia with his son, who graduated from Kentucky State Teachers College last June. It is always good to hear from members of the Class, even though there may not be too much of news of a general nature. — A good, long letter was received from Hewitt Crosby, XIII, who is again wintering near Ft. Lauderdale, Fla. Mostly discussing details of our 50 year gift, he comments on Frank Jewett's death: "His life was a distinguished and useful one," echoing all our thoughts. He hopes to see Tom Sears and family and Regestein during the winter.

W. C. Lounsbury, VII, is now at Fort Myers, Fla., and we hope he, also, can join the others for a reunion this winter. As chairman of the Human Relations Award Committee of the Society for the Advancement of Management, Myron H. Clark of Boston presented the Society's Human Relations Award to Cyrus S. Ching, director of the Federal Mediation and Conciliation Service, at the Hotel Statler in New York on November 3. — FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston 9, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, Box 103, South Wellfleet, Mass.

• 1905 •

Harold B. Harvey, VI, died at his home in Santa Monica, Calif., on December 3 after a lingering illness of several months during which period, contrary to the advice of his medical attendants, he had flown back and forth to his business in Chicago about every two weeks. Pete's loss is very severe both to his Class and to M.I.T. in general for he was a generous contributor of advice and more material things. He early pioneered in aluminum and brass forging, originating many processes in nonferrous metals, was first president of the National Brass Forging Association and one of the vice-presi-

dents of the Aluminum Association of America. He was the president of the Harvey Metal Corporation of Chicago, which he founded. He was president of the Chicago Rotary Club in 1919-1920, and a member of the Corporation of the M.I.T., his term expiring last June. Few people know of Pete's many philanthropies to various colleges including M.I.T. and to young men and women, whom he helped obtain a college education. Those of us who have attended reunions during the last several years were privileged to know Pete more intimately and to appreciate his sterling worth. This applies as well to his wife Alwilda, who alone survives.

Albert L. Smith died on November 22 at his country home in West Newbury, Mass., to which he had retired but a few years ago. He retired from the General Electric Company, of Cleveland, Ohio, where he had been plant engineer and where he had served for a continuous period of 36 years. He was a member of the American Chemical Association, the Groveland, Mass., Grange and the Essex County, Mass., Pomona Grange. Two sons survive, Albert L., Jr., of Groveland and Manning A. Smith of Louisburg, Pa. Andy Fisher is responsible for the information that the latter was a chemist having an important post in developments at Oak Ridge.

The request for dues, unpaid on the last assessment of June, 1949, brought in some news as well as checks. Gib Tower tells us he has another grandchild, a boy, making his score three grandsons and two granddaughters. Gib is still with the United States Navy Office at the Bethlehem Steel Company, Quincy, Mass., working on stability of navy ships, calculating inclining experiments, and so on. I did not ask him what that means as some investigating committee might call him up. Frank Chesterman has given up the life of a farmer, temporarily, to take up residence in Philadelphia for the winter; but about next May he'll be back at the farm at Hampton Falls, N.H., pushing the throttle of his tractor, and doing other hard farm chores. W. L. (Walt Lawrence) Whittemore having retired on account of health, a heart trouble, which "circumscribes my physical efforts" has moved to 3902 Drake Street, Houston, Texas, living with a married daughter. Says he sees Willard Simpson of San Antonio at Shrine and A.S.C.E. meetings. Lovell H. Parker, in assuring us that he will attend the 45th reunion next June, says: "I work reasonably hard on other people's income tax problems, but still find time for about three rounds of golf a week."

Robert Fowler writes: "I am enclosing herewith my check for \$6 as my contribution towards the good feeling of being considered a member of that illustrious Class of 1905. As I have been confined here at home for nearly three years, I am totally unable to participate in the various festivities and get-togethers of this fine group of fellows. With my very best wishes for the continued good health and happiness of each member of this Class and the gratitude that I deeply feel for being included in the list of Alumni of

M.I.T. where I have always sincerely regretted that I was not able to have completed my course in the proper manner and then truly become a member of the Illustrious Alumni." Winfred Taylor, II, has retired and is living happily with his youngest daughter at 36 Sommer Avenue, Maplewood, N.J. Like Parker, he golfs by avocation, also baby sits (non-professionally), "since to my five children have been born nine children." Nine grandchildren! Who can beat that? We now have the "low-down" on the retirement (?) of Chester Allen which we mentioned in a previous issue. The Lansing, Mich., *State Journal* tells us: "Chester L. Allen, who retired in June as head of the department of civil engineering at Michigan State College, East Lansing, Michigan, has joined the faculty of Clarkson College, Pres. Jess H. Davis announced today. Mr. Allen has been appointed an associate professor of civil engineering. Prof. Allen had been a member of the Michigan State College faculty since 1919 and served as head of the civil engineering department since 1924. He was graduated from . . . Technology in 1905 with the degree of bachelor of science. In 1917 he received his master's degree from Pennsylvania State College, where he was a member of the faculty from 1911-15. Mr. Allen also served as head of the civil engineering department at Gettysburg College from 1915-18. Mr. Allen has been an active member of several professional societies, including the American Society of Civil Engineers, the American Society for Engineering Education, the Michigan engineering registration board and the Michigan Engineering Society. He is a registered professional engineer in Michigan and from 1920-1930 was active as a consulting engineer on numerous projects with the firm of C. E. Allen associates. An honorary degree of civil engineer was conferred on him by Lafayette College in 1916. Active in civic affairs of East Lansing, Mr. Allen served as city engineer there from 1924-1936 and as a member of the board of education from 1926-1937. He was president of the latter organization from 1932-1936. Mr. and Mrs. Allen are residing at 11½ Market St., in Potsdam, New York."

Charlie Johnston has written an interesting story and because it is so interesting I am quoting intact: "As to news, what might I send you that would be of interest? I am keeping busy in my old age and continue to have a good time in the work that I am doing. Since becoming vice-president (Virginia Smelting Company), I have had time to review some of the possibilities for our liquid sulphur dioxide in which, at times, I had some interest—and among these are two on which I have been doing some personal work for the past two years. Both are in the fields about which I know nothing—one the medical field, and the other, agriculture. The one in medicine is the use of liquid sulphur dioxide for athlete's foot and in a water solution as sulphurous acid, and further, as a modified sulphurous acid for infection in the outer ear. Now that the doctors have been working on these things for a number of years they have accumulated a good many hundred

cures, and practically nothing objectionable at all has shown up. In agriculture, 10 years ago, I had some research done to use sulphur dioxide in silage, particularly grass silage. The results were most encouraging, and starting in 1948 and working through 1949, I have had some most encouraging results. The ramifications of the possibilities seem to be greater and greater; meaning, of course, the need of understanding more and more of the things involved. I have on my desk from one professor, a biologist, some four pages of questions on different things involved. Silos this year have been treated at a number of places in eight of the northeastern states and it has required a great deal of travel and driving to observe the work and the results. Some of the professors have told me that it is estimated that not over 50 per cent of the food value of all growing forage crops ever gets in the mangers of the cattle who will eventually eat these crops. Even in making hay under the most favorable conditions, there is a large loss of nutritional value before the cows eat the hay. It rather looks as though the proper use of sulphur dioxide in small quantities can preserve quite a large amount of the nutritional value that is now currently lost in silage and in hay. It is lots of fun, and I have met some very interesting men; and to me, city born and bred, I have seen some very interesting things. I have just moved from my old home at 214 Broad Street to a smaller, more comfortably arranged home just two blocks away, at 2601 Bayview Boulevard. This new home is right on the waterfront, and from my front windows I can look up the Chesapeake Bay. The new home is the next house to one in which I lived shortly after I came to Portsmouth some 34 years ago, and it is just two doors from my daughter's home. I seem to continue to be well, and I am carrying on with many extra-curricular activities such as being one of the wardens of St. John's Episcopal Church, on the board of the Young Men's Christian Association, Community Chest, and as a director of the Southern States Industrial Council and of the Atlantic and Danville Railroad, which is the road running from West Norfolk to Danville, some 270 miles west of Hampton Roads. I am also doing what I can for the M.I.T. Development Program, and recently had the pleasure of serving as toastmaster at an all-Virginia dinner given in Richmond where we had the pleasure of hearing Treasurer Ford tell us much about the Institute." This story is particularly apt because it gives in detail the outside work one very busy man is doing. There are, doubtless, many of his classmates just as actively engaged in avocational pursuits. Let's hear some of them.

I have to correct one word in a previous article in which I mentioned that Andy Fisher served a barnacle chowder. Andy's objection is based on the fact I failed to realize that chemists with M.I.T. training had perfected a paint which, applied to the bottom of boats, prevents the collection of barnacles. The word should have been quahogs.—FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin

Street, Boston, Mass. **SIDNEY T. STRICKLAND**, Assistant Secretary, 69 Newbury Street, Boston, Mass.

• 1907 •

Dick Ashenden, Gene Banfield, Clinton Barker, Howard Chase, Bill Coffin, George Crane, Tom Gould, Alexander Macomber, Gilbert Small, Oscar Starkweather, Phil Walker, and Bryant Nichols gathered at the Silver Room at Walker Memorial at Cambridge on the evening of December 9 for dinner and for good fellowship. After the dinner, I told the men of recent activities of any of our classmates about which I had learned and read aloud a very interesting letter which John Frank had written under date of November 16 telling in considerable detail of the trip to Europe that included London and Paris which he and Mrs. Frank took during October and the first two weeks during November. Then Alexander Macomber, as chairman of the board of the rather recently formed company known as Northeastern Gas Transmission Company, told in a very interesting and informing way of the plans that are being made to bring natural gas by pipe lines from Texas into New England, and especially of the part which his corporation hopes to play in this project.

From a letter dated December 8 received from Merton Sage in New York, I learned that the following classmates attended the "Mid-Century Dinner" of the M.I.T. Club of New York which was held at the Biltmore Hotel on December 6: Anthony Arnold and his wife, Mr. and Mrs. Charles Bragdon, Mr. and Mrs. Harold Farrington, Mr. and Mrs. Hugh Pastoriza, Mr. and Mrs. Merton Sage, and Otis G. Fales, Louis Freedman, and Robert Thayer. The two principal speakers were President Killian of the Institute and Clarence Howe of our Class, who as you all know, is Minister of Trade and Commerce for the Dominion of Canada. The speech which Clarence made was reported at some length in both the *New York Times* and the *New York Herald Tribune* on December 7. I quote briefly from each of these reports. The first portion of the story in the *Herald Tribune* is as follows: "Appealing for a reduction of tariff barriers, C. D. Howe, Canadian Minister of Trade and Commerce, warned here last night that the alternative is a collapse of multilateral trade or a continuation of large scale lending by North America to 'proud countries which do not want charity and are able to pay for their needs with goods.' Mr. Howe, who spoke at the mid-century dinner of the Massachusetts Institute of Technology Club in the Biltmore, said that the trade problem between the dollar world and the non-dollar world is similar to the war-time economic problem that existed between Canada and the United States and which was successfully solved." A portion of the story in the *New York Times* is: "Canada's Trade Minister, who is in charge of atomic research in that country, said yesterday that he knew of no shipments of uranium from Canada to Russia in 1943. The Canadian official, Clarence D. Howe, said he was checking

the report that uranium had been purchased in that year from Canada for transfer to Russia. This allegation cropped up in the current investigation of charges that uranium was flown to Russia in 1943 from Great Falls, Mont., with the reported cooperation of Harry L. Hopkins, late confidante of President Roosevelt. At that time, said Mr. Howe, he was working very closely with the United States on atomic matters, and would have tried to prevent shipments of uranium to Russia. Mr. Howe discussed this matter during an interview that preceded delivery of a speech before the mid-century dinner of the Massachusetts Institute of Technology at the Biltmore Hotel."

Anthony Arnold, in acknowledging receipt of the corrected list of addresses of '07 men, together with a reprint from the November Review, and the treasurer's report for our Class (similar papers having been sent to all of you last November), says that he is now vice-president and treasurer of the American Agricultural Chemical Company, with his office at 50 Church Street, New York 7, N.Y. — Charles E. Baker, whose home is at 1158 Avon Avenue, S. W., Atlanta, Ga., is vice-president and general manager of Dixie Printing Ink Company and William Armstrong Smith Company of East Point, Ga. Charles writes that he is enjoying reasonably good health, although he is suffering in some degree from the loss of eyesight. He says that he and Mrs. Baker have been in the South now for five years, and they find the climate very agreeable as compared with that in the North. He has five children and 14 grandchildren. — A note dated December 7 from the secretary to Jim Barker in Chicago acknowledging receipt of the same type of papers as those sent to Arnold, referred to above, stated that Jim was in Turkey at that time on an economic mission for the World Bank but that he expected to be in Chicago again soon after Christmas. A clipping from the *Berkshire Eagle* of Pittsfield, Mass., in their November 1 issue states that according to what was then the latest issue of *Newsweek* magazine, Jim was being favored by President Truman and Defense Secretary Johnson for the chairmanship of the Munitions Board. Whether anything further has developed in connection with this possible position for our classmate, I do not know.

Herbert B. (Bebe) Hosmer wrote to me early in December saying that he is located for the winter at 600½ East Florence Boulevard, Casa Grande, Ariz. — Harold D. Reed, who for many years has been an engineer with the New England Telephone and Telegraph Company and who lives at 109 Brook Street, Wellesley, Mass., has written me that he expects to retire during the latter part of 1950 and may at that time take up his residence on a farm which he has used as a summer place in Bristol, N.H. — According to word received from the Alumni Office, Edwin C. Richardson has left Montreal, Canada, where he has been located for many years, and his correct address is 217 West Cypress Avenue, Redlands, Calif. I have written Richardson requesting information as to his present activities but have received no reply and, conse-

quently, know nothing whatever about his professional or personal doings.

Under date of November 27 I received from Chet Vose a note which I quote in full knowing that it will interest you: "The other day, in looking over some old coins, I found a few with the famous date of 1907. I am enclosing one for your unrestricted use. You can keep it as a pocket piece or buy yourself a newspaper with it. As you probably noticed at Oyster Harbors, I am gaining in health and am already beginning to look forward to the next reunion. It has been my pleasure to have dinner with our classmate, Cecil Baker, a couple of times within the past few weeks. He tells me that he, too, enjoyed the reunion, which, by the way, was his first, and that he, too, hopes to attend the next one." — Those of you who attended our reunion at Oyster Harbors in June of 1949 will remember our genial host, Mr. Cecil H. Clarke, the manager of the Club. It occurred to me that he might be interested in looking over copies of our class list and report of our reunion; so I sent him these papers, and under date of December 7 he wrote me the following note: "Thank you very much for your letter of November 27th, and for the reprint from *The Technology Review*. It certainly was interesting, also a very good 'advertisement' for Oyster Harbors Club. I look forward with pleasure to having your class reunion at Oyster Harbors again in 1952." — **BRYANT NICHOLS**, Secretary, 23 Leland Road, Whitinsville, Mass. **PHILIP B. WALKER**, Assistant Secretary, 18 Summit Street, Whitinsville, Mass.

• 1909 •

A picture of Brad Dewey, X, appeared in the Worcester, Mass., *Telegram* of November 22 as the speaker at the Institute for Industrial Relations at Holy Cross College. The address centered on the present-day and future emphasis of labor on pensions and benefits. He pointed out that all phases of worker security emphasize the common interest of capital and labor in the continued prosperity of business. The owners always have the advantage of being able to sell out and go elsewhere, while labor cannot move without sacrificing its security. He believes that enlightened labor and management in the future will meet to discuss what is best for each rather than the rights of each. In order to assure longtime prosperity for both labor and capital, labor will assist by weeding out inefficiency and featherbedding in its own ranks and work to increase the efficiency of management. Brad delivered the principal address at the Chemical Engineering Award Dinner at the Waldorf Astoria in New York on December 1, honoring the Celanese Corporation of America. He pointed out that because the great companies were able to provide the arms and equipment, our soldiers, sailors, and airmen won World War II. Only the big process companies could furnish the technical brains, the know-how, and sheer power to produce in tremendous volume synthetic rubber, high-octane aviation gasoline, toluene, magnesium, rocket powder, and the atomic bomb. If another war should develop — which God forbid — it

would be necessary for the government to call on the great companies again for arms, equipment, skilled chemists, physicists, engineers, production men, and skilled workers. Yet, through the efforts of some misguided and uninformed zealots, the government is seeking to destroy the very companies to which it turned in the last war. Big companies, medium and small companies, as well as small industries are all necessary in our industrial economy. They all complement one another, many buying from and selling their products to the others, and all contribute to the prosperity which has brought such a high standard of living in the United States. The honor was paid to the Celanese Corporation for its development on a production scale of a direct process of oxidizing natural gas constituents to make a range of organic chemicals, useful and available, not only to itself, but to its rivals in business. Only a large company with a large research laboratory and staff and great resources could have done this.

Johnny Nickerson, II, is another member of the Class who has gained distinction as an after-dinner speaker. On November 10, he addressed the Society for the Advancement of Management at the Hotel Sheraton, Springfield, Mass., the subject being, "The Degree of Labor Participation in Technological Changes and Savings." As we have already reported, Johnny is now a consultant in management and engineering in West Hartford, Conn. The Review Secretary and Muriel were most pleasantly surprised this past summer by a visit at the Isle of Springs, Maine, from Johnny's daughter Nicky and some friends. She loves nothing more than being out in a boat in a bumpy sea and had planned a week's cruise along the coast of Maine on one of those windjammer schooners. She's connected with a radio station in Hartford.

Recently, an item appeared in the Newark News concerning Lewis H. Johnson, VI, and family who had just returned from a four-month's vacation in New England to their home in Long Valley. The neighbors were so glad to welcome them that there were enough mail and notes to fill a clothes basket. The Johnsons spent most of their summer vacation at Pleasant Beach, South Thomaston, Maine, and after that stopped at Granby, Mass., to visit their daughter, Elizabeth, and her husband, Dr. Scott Sexton. Three years ago, following Lewis' retirement from the Bell Laboratories, the Johnsons moved to Long Valley from Madison where they lived for 30 years. Lewis' sparetime hobbies now are educational work for the United States Power Squadron and creating Christmas card covers and personal letter heads for the Johnson family. They are planning a holiday visit with another daughter, Mrs. George Albertsen of Annapolis, Md., and son, Ralph E., who is with the Associated Press, Atlanta, Ga.

Molly, XI, has sent us the following from New York: "This is to advise that the Annual Dinner of the Technology Club of New York was held at the Hotel Biltmore on December 8, with approximately 500 alumni, wives and friends present. Outstanding addresses were made by President Killian '26 and by

Clarence Howe '07, Minister of Trade and Commerce of the Dominion of Canada. The Class of 1909 was represented among those present by Harold, I, and Mrs. Ballard; Chauncey Crawford, I; Tom, I, and Alice Desmond; Dale Ellis, XIV; Paul Lord, III; and myself."

Paul writes: "I ran into our Review Secretary most unexpectedly here in New York the other day. His being here was not too clearly explained in the minute or two we saw each other, but just now I received a manuscript and all is clear. Chet was on his way to attend at Pocono Manor, just over the Pennsylvania line, a conference on insulation under the auspices of the National Research Council. Now I got my degree in Course V, Analytical Chemistry, and I would have said that I knew a thing or two about this and that, but I can assure you that the Review Secretary has it all over me! His paper is entitled 'Built-up Mica Plate for High Temperature Applications' and he shares the authorship with his colleague, W. R. Mansfield, chemical engineer for the New England Mica Company of Waltham, Mass. This type of mica plate was originally Chet's idea and he and his colleagues hold several patents. It is used in nearly all the automatic toasters and in a large number of flat-irons and other heater appliances. This paper and the method of its presentation confirm anew my feeling that our Review Secretary is really quite a guy! Chet advised me that after Pocono he was going to the Naval Research Laboratory in Washington, D.C., to which he has recently been appointed civilian consultant."

The following is taken from a news item appearing in the Lawrence, Mass., Eagle: "Tribute was paid to Herbert H. Palmer [VIII] by former pupils, parents and friends at a gathering held in the Perley High School auditorium Monday evening. Mr. Palmer, a former principal and school teacher, was introduced by Robert F. Metcalf, a representative of the Perley High alumni, who presented him with a sum of money in behalf of the alumni and townspeople for his loyalty to the high school and students for the past sixteen years. Mr. Palmer resigned this fall. Mr. Palmer, reminiscing, spoke of when he attended high school in Georgetown in the old Central High School which is now the Central Grammar School and the Perley Free School which was built in 1901 and burned in 1933, being rebuilt shortly afterwards and named the Perley High School. He also spoke of when he attended M.I.T., being a graduate of the Institute. He related of research work he had done for Harvard and also in New York." — PAUL M. WISWALL, Secretary, 527 Belleville Avenue, Glen Ridge, N.J. CHESTER L. DAWES, Review Secretary, Pierce Hall, Harvard University, Cambridge 38, Mass. Assistant Secretaries: MAURICE R. SCHARFF, 285 Madison Avenue, New York, N.Y.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

• 1910 •

All classmates have received by this time Cliff Hield's January letter giving the full program for our 40th reunion.

Cliff has given his time and energy to make this reunion a big success. If you have had any doubts about attending this June, they should have been dispelled. I think the time, the place, the entire program and the renewal of old acquaintances will make this reunion an event never to be forgotten for the members of 1910. Let every 1910 man write to Cliff and tell him that he will attend.

The following is from the News from Rotary International: "Manuel Adrian Navarro, consulting engineer and Ecuadorian national leader, M.I.T. graduate of 1910, is a District Governor of Rotary International, world-wide service organization, for 1949-50. As Governor he coordinates the activities of the 15 Rotary Clubs in Ecuador. During the year he will visit each of these clubs to offer advice and assistance in service work and administration. Mr. Navarro is a consulting engineer for the Shell Company of Ecuador and president of the Development Bank in Quito. He has served his country as Minister of National Defense, president of the Chamber of Deputies, Senator, delegate to the United Nations, and as an attache in the embassy in Washington, D.C. He also has been Rector of the University of Quito and has held a number of other civic and governmental offices. Before joining the Shell Company, 11 years ago, Mr. Navarro was president of the Guayaquil & Quito Railway Company. He is a charter member and Past President of the Rotary Club of Quito, which was organized 22 years ago. With the continued growth of Rotary in all parts of the world, membership in Rotary International is now at an all-time high, with 330,000 business and professional executives active in 7,000 Rotary clubs in 82 countries and geographical regions." — HERBERT S. CLEVERDON, Secretary, 120 Tremont Street, Boston 8, Mass.

• 1911 •

Was I pleased to receive in early December a fine letter from Dick Ranger, VIII, President of Rangertone, Inc., Newark, N.J., enclosing a menu of the Mid-Century Dinner of the M.I.T. Club of New York on December 6 in the Grand Ballroom of Hotel Biltmore, with "Greetings to Dennie from 1911-ers" on it! Dick wrote: "This is to prove to you that we were all thinking of you at the New York banquet. We sure missed you and your bubbling enthusiasm, particularly when it came to the singing. We took up two tables, with a few 1910 in with us, as you will note. Bob Haslam, X, gave us a mighty good analysis of the program of the Development Program. Johnnie Scoville, IV, was bouncing around in his usual fashion — he was the only one free of a spouse. But it was a very nice affair, and everyone of us had a grand time in comparing notes, and the wives got a lot out of the fashion show. So a good time was had by all. By the way, Arthur Brown is now assistant director of the leather and tanning department at Pratt Institute in Brooklyn. We are looking forward to the Cloak and Suit setup (annual National Retail Dry Goods Show, which I usually attend during the second week in January) which we trust will bring you

down our way again." Signatures on the menu were those of Dick and Laura Ranger, G. Arthur and Hazel Brown, Jim and Tonie Campbell, Joe and Rose Harrington, Bob and Alice Haslam, Johnnie Scoville, Nat and Lou Seeley, Erv Young and two fraternity brothers of mine: Jim Tripp and Ken Wright. In the list of patrons and patronesses, 1911 was represented by the Bob Haslams, the Ralph Walkers and Rufe Zimmerman, IX. Thanks a million, boys and gals!

The December wedding forecast in the December issue's class notes for Gordon Glazier's daughter, Dorothy Louise, to Dr. William P. Dodson of Norfolk, Va., took place in mid-month at St. Anne's Episcopal Church in Lincoln, Mass. Following the ceremony, there was a fine reception at the Glazier's home, "Ledge-wold" nearby. Dorothy's Uncle George (our own General Kenney) unfortunately was unable to attend due to illness.

George's book continues to get rave notices. Henry Harris, in the Boston Sunday *Globe*, wrote: "For those who enjoy good reading, 'General Kenney Reports' is the best thing in war memoirs since the Stilwell Papers. And this is without vinegar, for Gen. Kenney, unlike the commander in Burma, knew what he wrote was going to be published. Besides, he wasn't mad at anybody. . . . Of course Gen. Kenney's most interesting relationship was with Gen. MacArthur, who had opposed an independent air force in 1932. When Gen. Kenney reported, the Supreme Commander spent a half-hour laying out the air force in lavender as 'boulevard shock troops' personally disloyal to him. Kenney reported that MacArthur had asked for his services; that he had been in hot water in the Army for many things, but never disloyalty; that he was qualified to do the job and would do it. If he felt disloyal he would tell Gen. MacArthur and pack up to go home. 'George,' said the Supreme Commander, 'I think we are going to get along together all right.' They did. MacArthur, whom Gen. Kenney admires intensely, backed him up and finally admitted that his stand against the independent air force had been 'the greatest mistake of my life.' The book is a treat."

"Guess you will need micro-film to keep your files on Kenneyana," wrote Selly Seligman, III, enclosing the book page of the New York *Herald Tribune* of November 30, which contained a picture of George and two other authors, guests at a luncheon in New York City, and a news story titled, "Kenney Denies Service Fight Is Peril to U.S.," which reads in part: "General George C. Kenney, commandant of the Air Force University of the Air and one of America's outstanding air strategists, said yesterday that 'no citizen ought to worry about national security being endangered by current disagreements among chiefs of the armed services. There would be real cause for worry, he said, if the heads of the Army, Navy and Air Force were agreeing unanimously without argument to all defense proposals and strategic plans presented to them. The longer the so-called Battle of the Pentagon lasts, he added, the more certain you can be that those engaged

will come up with the right answer.' General Kenney, author of 'General Kenney Reports,' based on the diary he kept while acting as General of the Army Douglas MacArthur's war-time air commander in the Southwest Pacific, spoke to almost 2,000 persons attending a Book and Author Luncheon in the Hotel Astor, sponsored by the New York *Herald Tribune* and the American Booksellers Association.

"General Kenney's remarks about 'inter-service squabbling' were made as a preface to his prepared address on the importance of unified command in both peace and war. He stressed that in his opinion the present Department of Defense was 'working all right' and that unification was a fact rather than a theory. 'A little argument doesn't mean that unification has broken down,' General Kenney said. 'Remember that quarrels in the family don't necessarily end in a divorce. Thank God we still have a country where you can argue. When we come out with an answer it usually is the correct one.' General Kenney recalled the constant need for cooperation among Adm. Thomas C. Kincaid, who commanded naval forces assigned to the Southwest Pacific; Gen. Walter P. Krueger, General MacArthur's ground force commander, and himself. If any argument came up that the three service commanders could not settle, General Kenney revealed, General MacArthur would make the final decision. He added: 'Actually, he (Gen. MacArthur) didn't have to make very many.' The greatest mistake of the Pacific war, according to Gen. Kenney, was the failure to have one 'overall commanding officer for the whole effort against Japan.'" Appended to the story was an editor's note: "The text of General Kenney's address at the luncheon appears on the following page—the editorial page." It was a stirring address.

Had an enjoyable evening with Harold Robinson, I, at a dinner of the M.I.T. Club of Worcester County in Worcester on December 6. He and his older son, Henry, a Norwich graduate, operate Robinson Engineering, Inc., 311 Main Street, Worcester 8, Mass., registered engineers and land surveyors. At present Henry is taking four months active duty with the Army and during December is going to instructors school at the Staff and Command School at Leavenworth, from which he graduated in 1944. He is getting a great kick, because he has to teach higher brass at the S. and C. School as part of his course. Robbie told me Henry finds it a pleasure to make them step around and jump them if they do not have their lessons prepared; although, as he is teaching tactics he probably has to do some studying himself. Henry is now a major but his recommendation has gone in for promotion to lieutenant colonel and he has passed the examining board at Boston. He is now commander of the 919th Field Artillery, which takes in four batteries there in Worcester and Springfield. After January first he goes to Fort Devens in Ayer, Mass., to teach officers for two and a half months and then returns to work to help out the old man, as Robbie put it. At that time, Rob-

bie added, he and his wife plan to take a vacation.

Charlie Linehan, I, received well-deserved recognition at the 25th annual meeting of the Massachusetts State Coaches Association at the Hotel Lenox, Boston, on December 10. In behalf of the coaches, Jack Heaphy, coach of Dedham High School, presented Charlie, perennial secretary and a 25-year man in the association, a purse of \$100. Although still teaching mathematics at Rindge Technical School in Cambridge, Charlie is no longer coaching football, but continues his membership in and secretaryship of the coaches' association.

Liv Ferris, VI, announced his retirement from the Bell Telephone Laboratories and the transfer of his residence effective December 1. Leaving the fine home they had maintained in Upper Montclair, N.J., for so long, Liv and his wife have now taken over his old family estate—Ashton Plantation, Lecompte Post Office, Louisiana. Every good wish for a happy life of retirement, good people and don't forget the 40-year reunion on June 8–9–10, 1951, at East Bay Lodge, Osterville, Mass!

Speaking of East Bay Lodge, Sara and I received a very novel Christmas card from the Leghorns, who so finely run that Cape Cod resort hotel. Using the 11 letters in "The Leghorns" to start an 11-line verse, the card tells in rhyme of the original Santa Claus now having a national rival here: the Santa Politician! Despite the welfare state, the poem concludes: "No tax can take away from us our gift of friendship treasured / So in this vein, we'd have you know how friends like you are measured."—Thanks, classmates, for the many fine Christmas cards we received from so many of you. The Nat Seeleys' card is again a masterpiece—this time a fine three-generation snapshot is the motif, showing Gran'pa Nat, Gran'ma Lou, Frank (Pa), Edie (Ma), Susan and Tommy, Uncle Clint (M.I.T. '51) and Uncle Dave (Yale '53).

Nat Sage'13, Director of the Division of Industrial Cooperation at M.I.T., writes: "In going through some old papers, I discovered a newspaper clipping of the vintage of December, 1911, which stated: 'Thousands of people in the vicinity of Marblehead were given a thrilling exhibition of flying yesterday, when, with ideal weather conditions, the Burgess hydro-aeroplane was in the air nearly all day. . . . Mr. Burgess also took up A. V. deForest, who succeeded in shooting three wild ducks.' This is clearly another first for M.I.T. Admiral deFlorez, II, who was the thesis partner of the late Professor deForest in measuring thrusts from an airplane engine, remembers the incident well. Luis later shot a couple of coots himself. Because the plane's top speed was 42 miles per hour, a good deal of skilful flying was required to get close enough to a duck to have him in range." Thanks, Nat, for a refreshing story of the past. Luis: Your very clever "gadget" card, with its ultimate production of Xmas-Rays, is very clever.

Ray Lord, VI, has changed his office location and should now be addressed at

Affiliated Factory Mutual Insurance Company, Turks Head Building, Providence, R.I., while Armand H. Peycke, II, is now at 5510 Sheridan Road, Chicago 40, Ill.

According to the November 30 report of Alumni Fund X, with one month to go we find 1911 still maintaining its position on top of the contributors' quota column with 140 contributors, or 116 per cent quota. In second place is the Class of 1896 with 99 per cent. On the amount side, we are tied for third place with 1893, at 116 per cent, our total being \$3,241.50 to date.

According to schedule, by the time these notes appear the general alumni solicitation for the M.I.T. Development Fund will be under way. Support it generously, classmates — there will be no Alumni Fund solicitation in 1950. By the way, if you haven't done so recently, "Write to Dennie!" — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

• 1912 •

The New York *Tribune* carried the story of President Truman's reappointment of Jerome C. Hunsaker to a new five-year term on the National Advisory Committee for Aeronautics. Jerome had been chairman of this committee since 1941. — More news is at hand regarding Charles L. Gabriel, who recently passed away. He is survived by his wife and two daughters, all of Philadelphia. Charlie passed away while attending a convention of the American Chemical Society at Atlantic City. At the time of his death he was vice-president and director of Publicker Industries, Inc.

Your Secretary enjoyed a very pleasant dinner in Boston as the guest of George Sprowls and his wife, who were here from Akron attending the American Trucking Association Convention. As manager of the highway transportation department of Goodyear, George was putting on a large entertainment for the visiting truckers. He seemed to be standing up under the strain very well. — Your Secretary has just enjoyed a trip to Guantánamo and back on the U.S.S. *Salem*, our latest and most powerful cruiser, as a guest of the Secretary of the Navy. A small party was taken aboard here at Boston and given the freedom of the ship while she was en route going and coming. Two days were very pleasantly spent at Port-au-Prince helping to open the exhibition there. If I were only younger, I think I might well join the Navy as it's a grand outfit. — FREDERICK J. SHEPARD, JR., *Secretary*, 31 Chestnut Street, Boston 8, Mass. LESTER M. WHITE, *Assistant Secretary*, 4520 Lewiston Road, Niagara Falls, N.Y.

• 1913 •

Three classmates have received mention in the newspapers. In the Boston *Herald* of November 7 Joe Cohen's, X, picture appeared along with Senator Saltonstall, Abraham J. Klausner and others. The occasion was the presentation of the

new Rabbi, Dr. Klausner, to the Temple Israel Boston Congregation of which he is president. The *Christian Science Monitor* of October 18 shows a large size copy of Rue de Chartres, St-Malo, an etching by Louis C. Rosenberg, IV. Of the picture, the article read: "Rue de Chartres, St-Malo, was made for the Chicago Society of Etchers in 1926 and was presented to associate members of the society. Three hundred and fifty copies were printed in London. The print shows the special interest of this American etcher in the architectural topic. A group of buildings in the densely settled district of a town provided a challenging pattern, an aggregate of gables, roofs, chimneys, windows, each contributing a special shape or a forceful accent. In the narrow streets were interesting vistas with a complicated play of shadows and light. Rosenberg qualified details with sensitive indications. In a Rosenberg etching, one feels that artist's affectionate handling of the line on the plate. There is no evidence of haste or tricky device. The draftsmanship is handled with respect as well as skill." The third mention appeared in the Dublin *Irish Independent* of June 4 about Alexander Vachon, V, Archbishop of Ottawa since 1940. "The Reverend Doctor was visiting in Ireland for three days as a guest of President O'Kelly. Dr. Vachon is the author of several well-known books of chemistry, mineralogy and geology, a fellow of the Canadian Institute of Chemistry and a director of the Canadian National Research Council, a State body responsible for directing and conducting research in many fields including atomic energy." Jack Farwell, II, wrote from Danbury, Conn., that he had recently attended an M.I.T. luncheon in Bridgeport with J. W. B. Ladd, I, to hear Professor E. H. Schell's talk on the expansion program. Jack sees Larry Hart occasionally at the Engineers Club in New York. On October 4, Larry was married at the Fourth Presbyterian Church in Chicago to Arrietta Wheat Davis, of Denver, Colo. Larry's son, Fred, was best man. The Harts are living at Alger Court, Bronxville 8, N.Y. Fred is now working for Penn-Dixie Cement Company.

Arthur Hirst, V, wrote: "Since you are not a pure chemist you may not have seen the enclosed write-up on our late classmate, Tenney Davis, V. He was so unobtrusive and retiring that I doubt if many of us, even Course V men, realized all that he had done." The write-up was in *The Nucleus* for June, the journal of the northeastern and Rhode Island sections of the American Chemical Society: "The death of Tenney L. Davis, on January 25, 1949, deprived the Northeastern Section of one of its most distinguished members, the world of scholarship of one of its ablest students of the history of chemistry and an internationally wide circle of friends and acquaintances of a highly esteemed, kindly disposed neighbor, so to speak. Although not having the good fortune to reach to three score and ten years of age, he did live to realize the fulfillment of one of his longest cherished dreams, namely, the successful launching of 'Chymia,' annual studies in the history of chemistry. Edgar Fahs Smith planned

such a journal, shortly after retiring from the Provostship of the University of Pennsylvania in 1920. Death ending this dream the mantle descended to the shoulders of Charles A. Browne. He, too, did not live to see the journal a reality. It fell to Tenney L. Davis, the third member of the triumvirate. . . . The first volume of 'Chymia,' appearing in the spring of 1948, contains papers by such of his old friends as Charles A. Browne, J. R. Partington, John Read and Ralph E. Oesper, all active students of the history of chemistry. Under the circumstances, it must have been deeply satisfying to be the editor-in-chief of this new series of scholarly studies. His own article, in this first number, nearly the last of many on the history of chemistry, pays tribute to his interest in explosives and related substances. In it he reviewed the 'Early Use of Potassium Chlorate in Pyrotechny,' particularly Dr. Moritz Meyer's 'Colored Flame Compositions,' the earliest (Leipzig, 1833) important publication on colored flames. Dr. Davis' paper, beginning with the declaration, 'the history of fireworks divides itself naturally into two principal periods, the period before the introduction of potassium chlorate and the period after the introduction of that substance,' sets forth Meyer's contributions to pyrotechny and his later influence.

"Although strongly attracted to the history of chemistry, as that subject is understood, Dr. Davis quite naturally turned to the much less known alchemy of the Chinese. Through collaboration with Chinese students and scholars, he was able to bring to the western world an appreciation of the contributions to alchemy by the Chinese philosophers. . . . Tenney Davis has left us a unique legacy. Through his efforts we can read, in translation, the ideas held and taught by the Chinese Alchemists and be in a position to see for ourselves how 'the fundamental alchemical doctrine of the Chinese, Arabs, and the later Europeans was the same.' A difference in motive existed. The European alchemists wished to make gold from base metal because of the intrinsic value of the noble metal itself, whereas the Chinese 'wished to prepare gold because of its magical efficacy.' In organic chemistry, Dr. Davis was best known for the 'urea dearrangement,' a name he applied to the orderly breaking down of urea, thiourea, guanidine and their derivatives when heated. These studies were published under the general title 'Studies in the Urea Series' (fifteen papers). Other publications dealt with complex metal pyridine cyanates and thiocyanates (six articles), dicyanic acid, guanidine, nitroamines, nitrocompounds, the oxidation of meta-diphenols and the effect of polarized light in organic synthesis. There was a notable series of papers on the chemistry of explosives, covering the effects of moisture on smokeless powder, colloidizing agents, tetryl, nitroguanidine and the role of diphenylamine as an anti-catalyst to improve the keeping qualities of smokeless powders. Volume I of 'The Chemistry of Powder and Explosives' was published in May, 1941, when Dr. Davis was recovering from a serious illness. This book finally appearing as a single

volume of 480 pages in June, 1943, 'is an exposition for chemists of the modes of behavior of explosive substances and the phenomena, both chemical and physical, which they exhibit.' It is, in fact, a fund of information, summarizing both the results of years of personal laboratory experience with powder and explosives and an intimate acquaintance with the primary sources in the literature.

"Tenney Davis was born in Somerville, Massachusetts, January 7, 1890. He grew up with his brothers, Philip and Robert, attended the Prescott Grammar School, the Somerville Latin High School and then became a student at Dartmouth College for the year, 1907 to 1908. In 1909, he transferred to . . . Technology to complete the full course in chemistry and receive the S.B. degree in 1913. Entering the Harvard Graduate School, he won the A.M. degree in 1915 and the Ph.D. in organic chemistry, under E. P. Kohler, in 1917. While at Harvard he was an Austin Teaching Fellow for three years. In his final year, as a Sheldon travelling fellow, he studied at the University of California. One of his most cherished Harvard memories was membership in the Josiah Royce seminar in philosophy. His life-long interest in scientific methodology took shape at that time. From August 1917, to April, 1919, Dr. Davis, serving as a First Lieutenant, Ordnance Department, U.S. Army, traveled widely in the United States and in France, inspecting and developing explosives. In the fall of 1919 he became an instructor in organic chemistry in the . . . Institute. . . . He organized a course in powder and explosives, began his well-remembered graduate course on synthetical methods in organic chemistry and took a share in the teaching of undergraduates. Later he was to deliver lectures on general chemistry to freshman students. But recently from Kohler's laboratory, one-four additions, Markownikoff's rule and the reactivity of alpha hydrogens formed important points of view in his teaching. At this same time he started a seminar on the logic of scientific inquiry which attracted practically all doctoral candidates at . . . Technology in the twenties. After 1925 he took over the course in the history of chemistry. With the completion of twenty-three years in the classroom and laboratory, he ended his services to the Institute, becoming Professor emeritus in 1942. On August 28, 1923, Dr. Davis married Miss Dorothy Munch of Somerville. For most of the next twenty-five years they lived in Norwell, Massachusetts. A host of friends and students who were privileged to share the hospitality of their home, will recall the charm of the village house. . . .

"During the summer of 1931 Dr. Davis lectured on organic chemistry and the history of chemistry at Western Reserve University in Cleveland. In the fall of that year he, with Mrs. Davis, visited places of particular interest to the historian of chemistry in England, Scotland, France, Belgium, Holland, Germany, Czecho-Slovakia and Switzerland. In World War II, Dr. Davis was a section chairman in the National Defense Research Committee organization from

June, 1940, to April, 1941. Beginning in January, 1942, to the last day of his life, he was a Director of Research and Development, National Fireworks, Inc. Until the end of the Japanese war in 1945, this work was in the service of the armed forces of the United States. Tenney Davis, philosopher, scientist, teacher, writer, lover of nature, often gave expression to his credo, 'Have fun,' he used to say. In other words, enjoy whatever you do, be it shopping, talking, writing, studying, trimming trees, piling wood. . . . Ending his address in the Hyde Park, Massachusetts, High School before the New England Association of Chemistry Teachers, February 15, 1930, he said: 'Students have an appetite for things to wonder at, the same appetite as that which is characteristic of children and of scientific investigators, and of healthy minds in general. The teacher who fails to supply material for it is neglecting an opportunity, for the student will absorb nothing with greater avidity. Where can better material for the appetite be found than in the history of chemistry? Here are the experiments which caused the great investigators to marvel. They are guaranteed to be provocative of wonder. By their histories do we know it. If they hadn't caused their discoverers to wonder, they wouldn't have been discoveries.' Dr. Davis was a member of the American Association for the Advancement of Sciences; the American Chemical Society; the History of Science Society (vice president in 1942); the American Academy of Arts and Sciences (corresponding secretary 1930-1937, recording secretary, 1937); the Newcomen Society; a corresponding member of the Royal Society of Bohemia; a member of the editorial board of the 'Journal of Chemical Education,' of 'Isis' and editorial associate of the 'Technology Review.' Late years he was one of the trustees of the South Scituate Savings Bank."

After nearly 40 years, I was delighted to get news from Arnold Wahl, V, under the letterhead of Wahl Institute, Chicago: "It is a long time since I have been at M.I.T., as you know, but I did get back to the convocation. I took my daughter, Rosemarie, along as a guest. She wishes to go to M.I.T. rather than Radcliff College. We attended the Winston Spencer Churchill reception, and nearly missed the Dr. Killian inauguration, but they placed us in the reserved seat section, so, we saw the procession very well. I looked for you and Larry Hart; as well as Eichorn, who was the captain of the freshman football team when I was the business manager. You asked for a short description of my activities. I am president of the Wahl Institute of Technology (W.I.T.). This job I have held since 1915, when the institute was organized to render technical service to bakeries and then established the brewing school which had been founded by my father in 1886. In 1940, we offered the brewers a home study course in brewing and malting technology . . . the first of its kind. Our enrollments carried us through the war years when we were obliged to suspend our resident courses. I have written some books; the first, which was published in

1930, is entitled, *Bread Production Under Scientific Management*. The first brewing volume was published in 1937, and is entitled *Beer from the Expert's Viewpoint*. Volume II, entitled *Brewing Materials*, was published in 1944. I am sending you, separately, a biography of the Wahl family, which you may place in the proper file for reference should it ever be needed." Arnold is a baking technologist and has done work in Europe. — FREDERICK D. MURDOCK, *Secretary*, Box 788, Pawtucket, R.I.

• 1914 •

The M.I.T. Club of New York held its annual dinner on December 6 at the Hotel Biltmore. Unfortunately, Charlie Fiske had already made a speaking engagement with an insurance group in Boston and was unable to be present, so no attempt was made to organize a special 1914 meeting. Your Secretary and Mrs. Richmond, however, were in New York and attended. Morris and Mrs. Goldenberg came in from Long Island, Art Peaslee from Hartford, and MacCart from Stamford. It is quite possible that we will try to hold a strictly 1914 informal dinner in New York sometime in the spring.

Bert Hadley, who has been serving as chairman of the board of trustees of Middlebury College for a number of years, has been elected president of the corporation of that college. Bert has been serving as a trustee for the past 13 years. Middlebury is one of the educational institutions where the president of the college and the president of the corporation are not the same. — Walter Eberhard's daughter Jean was married on December 17 in Belmont, Mass., to Robert Hughes of Cuyahoga Falls, Ohio. Miss Eberhard is a graduate of Wheaton College, and Mr. Hughes of Case Institute in Cleveland. The couple will make their home in New York City. — Clyde Ross, who for many years has been with the United States Geological Survey in Washington, has been transferred to the Denver, Colo., office of that department. He is making his home in nearby Golden, Colo., where the Colorado School of Mines is located.

Ernest Crocker was the speaker of the evening on December 8 before the northeastern section of the American Chemical Society. His subject, as might be anticipated, was, "The Chemistry of Flavors and Odors." Crocker, as most '14 men will recognize, is the outstanding authority on this general subject in this country. — Your Secretary recently noted that Homer Calver had been admitted to the membership of the New York Society of the Sons of the Revolution, which has its headquarters in the old Fraunces Tavern in downtown New York. Calver claims his membership from ancestors serving in the Rhode Island Militia during the Revolutionary War. — Alden Waitt has just returned to Washington after a delightful five-weeks' tour of Mexico. He covered a good part of the country, extending from Acapulco on the West Coast, the capitol at Mexico City, and eastern cities. Alden said this is the first real vacation he has had a chance to get since the outbreak of World War II. — H. B. RICHMOND, *Secre-*

tary, 275 Massachusetts Avenue, Cambridge 39, Mass. Ross H. DICKSON, Assistant Secretary, 126 Morristown Road, Elizabeth 3, N.J.

• 1915 •

By now you've all received the first notice of our 35th reunion, June 9, 10 and 11, at Coonamessett Lodge, North Falmouth (on Cape Cod), Mass. This permits returning to Boston on Monday, June 12, to visit M.I.T. and attend the annual Alumni Dinner at the Copley Plaza Hotel, Boston, Mass., Monday evening. Preceding this dinner, the Class will give a cocktail party at the Copley Plaza from 4:00 to 6:00, Monday afternoon for all classmates and their ladies. With Barbara and Virginia Thomas and Wally Pike in charge, this promises to be a delightful party. Plan to be there.

On December 2 at the Hotel Winthrop, New York City, we had a class dinner with the following present: Chauncey Durkee, Ben Lassen, Hank Marion, Tower Piza, Bur Swain and Charlie (Speed) Williams from New York; Tom Huff and Sol Schneider from Philadelphia; Bill Brackett, Sam Eisenberg, Larry Landers, Azel Mack, Pete Munn, Frank Murphy, Wally Pike, George the Pirate Rooney, Ed Sullivan, Henry Sheils and Max Woythaler all from Boston. Doug Baker was ill at home in Summit, N.J., but was thoughtful enough to wire his regrets. He's all better now. It was a pleasant and friendly gathering of old classmates. Max described his and Weare's arrangements for our June reunion at Coonamessett and all were in favor of them. Hank Marion will head a committee of Ralph Hart and Tower Piza to round up the New York group for the reunion. Hank stayed late with us Saturday night outlining his plans to arouse interest and get out a big attendance. Charlie Williams is a consulting civil engineer at 60 West 42d Street, New York City.

Henry Daley wanted to be with us but was grand to write us: "Received the notice of New York Dinner while flat on my back in Abington Hospital, and it did give me a lift. I really would like to attend but have to send my regrets and have notified St. Elmo Piza. I had to have some patching done, nothing serious, however; spent a week in the hospital and am now home until December 15, getting back into shape. I know you fellows are going to have a grand time and I wish I could be with you. Tell Hank Marion I hope he acts in a much more dignified manner than he did on the occasion of one of the New York dinners several years ago, and tell him to be sure and search his pockets before he ventures out into public. Regards to all the gang and may this be the best dinner ever!" In reply, we all signed a sympathy note to the old bald headed invalid and later I received this typically Henry Daley acknowledgment. Read it and laugh: "I certainly got a great kick out of the prize collection of autographs received this morning. It was swell of all you fellows to think of me in the midst of your gay activities at the dinner. Some of the autographs were a bit wavy and vague

and the devilish thought suddenly came to mind, could it have been that some of the boys were . . . (shame on you, Daley, for assuming anything stronger than Coca Cola was being imbibed.) Really, Azel, I got a lift out of it, and will keep the letter as a token of the fine spirit of loyalty in the great Class of '15. Good luck to you all, and if I don't see you before June, rest assured I am counting on attending our 35th to renew all the fine true friendships. Am coming along fine but the old sealegs are still a bit wobbly. Shades of Leon Errol come to my mind!" We're all glad to know that the repair job on Henry was successful so that he is now on his way back to complete recovery.

Ben Neal tried hard to make the New York dinner: "I had your letter about the 1915 class dinner at the Hotel Winthrop, New York. In connection with the endowment fund, I had Gabe Hilton and Tess down to dinner a week ago tonight. We went out and made a couple of calls, and in a kidding way I suggested that we all go down to New York for this meeting, which Tess enthusiastically accepted, and I think Gabe was half-way sold. But in the meantime, with a lot of other things coming up, I have sort of gotten cold feet on going down for this coming week end and duplicating the trip which I did make for the Notre Dame-North Carolina game on the 12th. As things stand today, I will not be there, but I could change my mind. However, give my kindest regards to all the gang."

On Sunday morning in New York the Boston contingent visited Ralph Hart at his apartment. Ralph had just returned from a month's trip to Mexico City, Cuba and Florida and had an exciting collection of souvenirs to show the boys. — At the dinner there was a long and lively discussion of our "\$50,000 for 1915 in 1985" campaign, details of which will be worked out later by Gene Place. Early in November, Gene Place had a 1915 lunch at the Los Angeles Biltmore with Francis Boynton, Bud Crowell, John Gallagher, Ray Stringfield and Bob Welles.

Ken Kahn's widow, Mrs. Minnie Kahn, very kindly and graciously helped Gene by telephoning around to the local classmates. This was in keeping with Ken's spirit and attitude toward his Class. She followed this up with this splendid letter: "I received The Reviews, and many thanks. I appreciate your sending them. Adele and Bob enjoyed seeing their names in The Review. I didn't know so much would be printed; anyway, we liked it and I hope Ray Stringfield and George Cunningham enjoyed seeing their names in print. Enclosed find a check to add to the fund for the M.I.T. Class of 1915. I'm sorry that it hasn't a lot more zeros attached — anyway, it will buy some postage stamps. So — until you and Mrs. Mack ring our doorbell!" Many thank Mrs. Kahn and may she and her family always consider themselves as part of good old 1915.

From his fascinating trip to the Orient on textile machinery business, Herb Anderson has sent a picturesque view of Istanbul Harbor, and wrote: "Last week (written on October 29) I was in Haifa,

Nazareth, and all over Israel. It's quite different from this very oriental city of Istanbul. The crowded streets, rough paving stones in the narrow paths, not to mention dodging wagons and carts every day, are a real 'workout.'" Then on November 1, from the Orient Palace Hotel in Damascus, Herb wrote this vividly colorful letter: "I think you remember my story of contrasts developing the comparison of the seasons of the year. As I enjoy my breakfast here at the Orient Palace Hotel overlooking an interesting square here in Damascus with a beautiful minaret facing me I cannot help thinking of the story. The battle or bomb-torn cities of Munich and Stuttgart, the complete areas leveled off in Jaffa and then the peaceful hills of Switzerland. A few beautiful women still wearing their black veils, many fast-moving businesslike and business dressed men. Then a group of dark sheiks sitting in a circle conferring in serious demeanor as I pass through to the dining room. Bright colored night shirt arrangements in purple, gold, white and blue in Cairo. The silent Sphinx and Pyramids off in the distance — just barely visible from my room at the Semoramis in Cairo. All still remind of the merits of variation and also of the complexities. Tomorrow morning I leave by car for Beirut, Lebanon; a few hours or days and then by air to Baghdad and Teheran before turning down toward Cairo and Bombay. In two weeks I must meet friends and business associates in Bombay, Mysore, Bangalore, Madras, Calcutta and Delhi if I am to be home before Christmas — and this is a must! Already I am thinking of our 1950 reunion and I hope we can get the Oyster Harbor Club at Osterville, even though my golf is still just as bad as ever. Best wishes to that grand, loyal band we think of as 1915 and, of course, to Frances and yourself." Herb certainly does get around and no doubt will return with additions to his repertoire as well as his experiences. I hope he saw Ken Boynton in Paris.

Plan to be with your classmates from all over the world for your 35th reunion in June. From now on you'll be hearing about it plenty! And, Azel is going to need a lot of your help. — AZEL W. MACK, Secretary, 40 St. Paul Street, Brookline 46, Mass.

• 1916 •

This is the month for Valentines so don't forget the fairer sex. Perhaps some of you will feel that we should be getting beyond the age for this sort of thing but it is our opinion that the ladies won't like it if we forget them. From the *Free Press and Melrose Home Sector*, Melrose, Mass., we note that Allen L. Giles is one of seven aspirants for election as alderman-at-large. Allen is well qualified for this office having been on the Melrose Planning Board for 11 years and on the Melrose Board of Aldermen for eight years. Allen has been chief engineer of the Longwood Towers Company for the past 15 years.

Phil Brooks writes that he has gone back into the Portsmouth Navy Yard as a mechanical engineering draftsman. He

has a boy and a girl. Both of them look just like Phil. It was nice to hear from him again. Tom Berrigan reports that he attended the December luncheon at Thompson's Spa. Others present included: Nat Warshaw (plus son), Hy Ullian, Harold Russell, Henry Shepard and Bud McCullough. Some notes picked up at lunch were interesting. From Hy Ullian: He saw Jack Camp in Mexico City in November and was invited to the University Club. Nat Warshaw's wife says that Nat spends too much time watching television (per his son). Believe it or not, experiments prove, according to Henry Shepard, manufacturer of golf balls, that a golf ball with deformations, such as appear on a Dunlop, facilitates flight of a golf ball and recent experiments show that a perfectly smooth golf ball travels in the air only 90 yards, whereas a golf ball with deformations travels 225 yards under similar experimental conditions. Henry Shepard is catching up on his work — more particularly he has gotten around to putting his 1921 reunion photographs in his album. His son is teaching in Cairo, Egypt, and likes it very much. We are very grateful to Tom for relaying all this interesting news from the luncheon meeting.

At long last a nice letter was received from Ernest C. Gagnon, now located in Lima, Peru, with Goodyear Rubber. Knowing that you will all be interested in hearing what he has been doing, we quote his letter in full: "Ever since graduation in 1916, I have been working for the Goodyear Tire and Rubber Company, except for nearly two years in the Army during the World War I. I first worked in Akron in the chemical department and was working as a compounder there when the war broke out. I went back to Akron early in 1919 and a few months later was sent to the Canadian plant of Goodyear in New Toronto. After two years I became chief chemist and worked as such until 1927 when I went back to Akron. After a few months in the research department there, I was put in charge of tire compounding and worked at that until the end of 1930. Then I went to Argentina as manager of the development department and stayed there until 1942. In November 1942, I came to Lima as plant manager of a new tire plant that was being started and that is where your letter reached me this morning. The Peruvian plant of the Goodyear Tire and Rubber Company, or Compania Goodyear del Peru, is located about two miles from Lima, between that city and the Port of Callao. It has a capacity of about 350 tires and tubes per day. All of the workers and most of the technical staff are Peruvians and have been trained by a few Americans who came here at first and are now reduced to four in number. The workmen are mostly Peruvians of Indian blood and many are Serranos, that is, natives from the high mountains who had no industrial experience whatever when they started with us. Training them has presented problems but they are good workers when once trained. The plant at present is supplying the total requirements of Peru. From the above summary, you can see that most of my career has

been in foreign operations of the Goodyear Tire and Rubber Company. I have found life in these foreign countries interesting and think that I have done quite a lot in developing "technically backward people." In March, 1918, during the World War I, I was married to Eva Chandler of Hartsboro, Ala. We have had no children. The above will let you know where I have been for the last 33 years." We are very grateful to Ernest for his newsy letter. Possibly some of you might like his address, which is: Cia. Goodyear del Perú, Apartado 1690, Lima, Perú.

Carlin Harrington writes to us that he has been out of touch with the Class for three years and that it had been more than three years since he has attended a class reunion. His letter came from Grosse Ile, Mich., and he writes: "After serving with the Yankee Division, World War I, decided to enter the automobile industry and spent about two years with the tool engineering department of the Packard Motor Plant in Detroit. I then joined the sales organization of the United States Radiator Corporation and am still with them. I was branch manager for a number of years, then returned to Detroit to fill in as plant engineer at our Detroit plant during the last war. For the past year and a half I have had some interesting work developing and promoting a new steel baseboard heating unit. Have been traveling a great deal for the past several months and hope to get back to New England again in the near future. My family is fast growing up. I have a daughter, Rae, now a senior at the Wayne University School of Music, a son Carlin, Jr., who is a sophomore at Detroit Institute of Technology and another son, Lee, a senior in high school." Carlin added that he enjoyed reading the class notes, which comment is much appreciated by your scribe.

We have a nice letter from Harold Gray. He seems to be permanently settled in Syracuse with his own business making precision investment castings. A year ago he incorporated under the name of Gray-Syracuse, Inc. His telephone number is Syracuse 3-3333 where visiting classmates may call him when in that vicinity. He said he had had a very pleasant weekend with Flipp Fleming the early part of the summer when Flipp and Margaret were on their way to New England. Some of you will remember that Flipp, Eddie Weissbach, John Ingle and Harold were the original four from the Class that went out to the Goodyear Tire and Rubber Company upon graduating. Arvin Page and Jap Carr went along later. Harold added that the only one of the group he had not seen for years was Johnny Ingle. He also thinks we are doing a fine job with the class notes. Sure hope you all feel the same way. If we can just get you to write in and tell us what's new with you, the rest is easy.

From Chuck Loomis we had the following interesting letter: "I had a chance to hear Bob Wilson speak here in St. Louis. He was one of the three principal speakers at a meeting of the National Industrial Conference Board. He was speaking on the need for more risk capital and

did an excellent job of presenting the facts and examining the implications. I suppose he was reading a paper, but the impression was that he was speaking extemporaneously. He has a very rapid but exceedingly clear delivery, so he is able to cram a lot of material into a short period of time. All in all, he continues to be a great credit to M.I.T. and the Class. I was in New York a month or so ago and had lunch and dinner with Bill Farthing. We were discussing what steps should be taken about the 35th reunion coming in 1951. I discovered in the current issue of *The Review* that 1911 has already engaged East Bay Lodge for that time. I am writing Bill today suggesting that we get busy and try to get Oyster Harbors Club. We have to do something right away." Chuck also complimented us on the column but we give all the credit to you who have sent material in for it. — Bill Farthing's trip to Mexico was entirely successful. He wrote he did a great deal of hard riding and the first day out killed a deer and a wild turkey and felt he could have duplicated that any day. He also caught some nice trout. Does anybody know the whereabouts of Brad Stetson? A letter to him was returned and we would like some information as to what he has been doing. If any of you know, please let us hear from you. Thanks!

Did you know that some of the material written by Joe Fouhy in his M.I.T. thesis was used in a current investigation of the Charles River pollution question? Joe, as you undoubtedly know, is now in the insurance business. We had a Christmas greeting from Katharine and Irving McDaniel. Mac wrote on the card, "Don't drop dead. I am back in circulation and will get off a letter to you real soon, although I haven't any news." Mac's address is Rancho Macajo, 2344 Covina Hills Road, Covina Knolls, Covina, California. — We are very happy to have a few words from Henry Benson in Walpole who sends us a brief sketch of the years with an apology for not answering some of our repeated requests for news. All is forgiven, of course, and the same is true for anyone who comes through with a little contribution. Henry says he has been married 29 years, has one son soon to marry and move into a new home he is now building on a G.I. loan, has one daughter married, and one grandson three months old. He goes on to say: "Since 1921, have been living at the same Walpole address and operating Benson's Auto Shop, specializing in tire sales and service, and vulcanizing. Twenty-one years of friendly relations with the Goodyear Tire and Rubber Company. Prosperous? No, but good health, good family, good wife, good home, and a pleasant yard, lawn, with flower and vegetable gardens for my hobby." He suggests dropping in on Route 1A if we are up that way, and we are glad to say that this may happen yet.

And here is an interesting excerpt of Nat Warshaw's earlier letter on his organization of the wartime Auxiliary Police in Belmont: "I was telling the boys at luncheon that there were not many classes at M.I.T. that went through two wars as we did. We were right in the vanguard of the first war and then most

of us had children or served ourselves in the second war as well. Unfortunately, I didn't get into anything really active in the second war with the exception perhaps that I helped to organize and was captain of the Auxiliary Police in the town of Belmont. This was no ordinary set-up because in Belmont we started organizing our auxiliary police or, as we called it then, our defense police, almost a year before Pearl Harbor. I was selected to be the captain of the police group. We had an organization composed of 250 men ranging in age from 21 up. These 250 men drilled every night according to Army training programs. They were uniformed and were supplied with real riot guns. As a matter of fact, they attained such fame that many newspapers and magazines wrote up the story of the Belmont Auxiliaries. I remember one very big double page article in an edition of the *Christian Science Monitor* that went all over the world and brought us many inquiries requesting information on what and how we were doing it. What with the war scares that we received from time to time regarding German planes and submarines off our coast, it made the work very interesting and exciting for the middle-aged men. As a matter of fact, this particular organization has continued in existence and still trains and drills and provides to the town an auxiliary police system for any emergency that may occur, even the Halloween pranks of the youngsters."

Late in November we were stopped by a very attractive picture in the New York *Herald Tribune* only to discover that it was none other than Steve Brophy's daughter, Cynthia Ann. Steve and Jessie were announcing Cynthia's engagement to Robert Conover Macauley of Greenwich, Conn., Yale '49.

On the occasion of the Mid-Century Dinner of the M.I.T. Club of New York at the Biltmore Hotel on December 6, the Class was well represented with two tables plus a full overflow table. A special feature so far as we were concerned and an innovation this year was the delightful cocktail party that Mr. and Mrs. Joe Barker arranged for the Class for the hour preceding the dinner. The following gives the list of those who attended, so far as our memory serves: Joe and Mrs. Barker, Bill Barrett, Walt Binger, Arthur and Mrs. Caldwell, Laurence deLabarre, Harold Dodge, Jim Evans, Bill Farthing and son, Ping Yok Loo and son, Al and Mrs. Pettee, Stew and Mrs. Rowlett, Len Stone, Bob and Mrs. Wilson. A last-minute, out-of-town urgency prevented Steve Brophy from being present but he was oh-so-ably represented by Mrs. Brophy. Party guests included: Mr. and Mrs. Hickernell, Mr. and Mrs. C. George Dandrow '22, Mr. and Mrs. Saxton Fletcher '18, Mr. and Mrs. Delos B. Churchill '40, Mrs. Larry Riegel, Messrs. Peter Wrightson and Thomas Creamer '40. Successful is the inadequate word for the party and Joe expresses the hope that classmates will get together in the same way next year.

Frank Hubbard responded to a recent request for news but says that what he has is anything but exciting. He indicates

that when he attended the reunion in 1946 he was with Columbia Aircraft Corporation in Valley Stream, Long Island, which had recently been sold. The new management began to build small commercial airplanes but it wasn't long before the market fell out from under them. He didn't wait for that to happen, however. In September of that year he, with the old president of Columbia, went with a new company called Aircraft Service Corporation. They had an overhaul and maintenance department at International Airport in Miami and also took over the Valley Stream plant early in 1947, when Columbia quit, and finished some Navy work that Columbia was engaged in as well as some Army work. Frank says that a short time ago they gave up the Valley Stream plant as their lease ran out and they were not interested in buying the (War Assets) plant. As a result, they have concentrated their work in Miami. He says they had been cleaning up the loose ends in New York until recently. Right now he is taking a little vacation and is uncertain whether he will land in Miami or try something new. "This," he says, "is the news to date."

We were pleased to have a note from Plitt Smeltzer that he couldn't resist our special appeal even if it is really more a matter of being pressed for news than for time. He is with the personnel and efficiency organization of the Water and Power Department of Los Angeles. He indicates that since the publicity given the Hoover Plan for government economy, those in public personnel efficiency work have been given some impetus in attacking the age-old problem. He says he is still interested in getting more out of the engineer than the engine, although his dusty professional license looks quite tempting when the head engineers look sour. He adds that a desert ranch under the Coachella Canal in the Palm Springs area is in planning for the retirement days.

Guess that is all for this month. Keep your letters coming, remember Valentine's Day and if you know Brad Stetson's address, send it along. — RALPH A. FLETCHER, *Secretary*, Post Office Box 71, West Chelmsford, Mass. HAROLD F. DODGE, *Assistant Secretary*, Bell Telephone Laboratories, 463 West Street, New York 14, New York.

• 1917 •

We regret to record that Charles T. Gilliard died on October 23. He was superintendent of the Andover, Mass., board of public works for many years, and more recently its town engineer, from which latter position he had resigned on the first of September.

Irving McDaniel has moved to his new ranch at 2344 Covina Hills Road, Covina Knolls, Covina, Calif.; and it is reported that he is planning to plant a new lot of avocados to replace those he lost last year. I. B. was for some years suspected of being a '16 man, but is officially part of '17. We are glad to claim him and trust that the emotion may be mutual. — Phil Hurlburt writes that "recent reports from Gerry Noyes on Lin's progress are en-

couraging, but Lin has had a bad time after each of three stages of surgery. A fourth operation is on the books and then a long period of complete rest is indicated, probably extending into the autumn of 1950." His address is Room 7112, University Hospital, Ann Arbor, Mich., at which letters, or callers will be welcome. — The American Association of Textile Chemists and Colorists gave first prize in a contest covering the entire United States to a scientific study by Alden D. Nute, who is with the American Cyanamid Company in Providence, R.I.

The few of you who have not seen the Executive Vice-president on his numerous, frequent and lengthy travels about the United States and adjacent countries will be delighted to know not only that he has thriven on his arduous task but is looking better than he has for years. His new exercise of pushing away from the table—with the collaboration of medical friends and advisors—has reduced his weight materially and cut his equatorial circumference eight inches at the Plimsoll mark—all apparently without affecting his disposition adversely. Unfortunately, he is no longer vulnerable and thus can dilate freely about the excess weight and gourmandish weaknesses of luncheon companions who have less will power, or less concern over their expanding plumpnesses. — RAYMOND STEVENS, *Secretary*, 30 Memorial Drive, Cambridge 42, Mass. FREDERICK BERNARD, *Assistant Secretary*, 24 Federal Street, Boston 10, Mass.

• 1918 •

For many of us, the first time we had seen a television screen was at our 30th reunion when Eli Berman set up a receiver for our entertainment. Now comes the news that Eli has four separate stores in greater Boston featuring over 100 models for customer selection. Sets ranging from the smallest table model to the largest console can be compared for price, beauty and performance. Inasmuch as the complexities of television are great, Berman Radio insists that every one of its service men be a factory-trained expert. Only from the experience of actually putting television sets together can the prospective service man who wishes to be employed by Berman meet the efficient labor standards the firm imposes. Berman Radio maintains an efficient truck service for the quick delivery of television models in keeping with its advertised policy of "immediate delivery."

John R. Markham has at last come into his own. He waited a long time for recognition deserved years before it came. But at last he is a full professor and in charge of the new supersonic wind tunnel which was dedicated on December 1 with full representation from the high brass of the Army and the Navy Air Force as well as from the aircraft industry. The building where John presides is called the Naval Supersonic Laboratory and was constructed under some sort of program hovered over by the Navy Bureau of Ordnance. Wind goes through a wind tunnel, of course, but particles of atmosphere moving at such speeds that the

scale model equivalent is a multiple of the speed of sound ought to have a better name than just wind. Incidentally, rumor has it that the fans that bat that breeze around require so much power that Johnny will have to create his whirlwind after the factories of Cambridge are shut down and the city fathers and mothers have gone to bed. Otherwise, the Cambridge Electric Light Company could not stand the load. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wil-son Road, Rowayton, Conn.

• 1919 •

There is not much news for this issue but your Secretary has heard from and seen a number of your classmates. These included lunch with Buzz deLima, a telephone call from George Michelson, parties at Joe Barker's and Nelson Bond's, where Charlie Farist was also in attendance, and many personal season's greeting cards. Many in the Class have asked me what has happened to the 30-year reunion pictures. — L. A. Jackson, manager — engineer, Little Rock Municipal Water Works, Little Rock, Ark., is secretary-treasurer of the southwest section of the American Water Works Association with about 700 members in the four states of Arkansas, Louisiana, Oklahoma and Texas.

Stuart J. Hayes drops a line to tell us that both of his twins were married last year while his youngest daughter is now in high school. He gets to the M.I.T. Club of the Connecticut Valley once in a while. — From the West Coast, R. S. Holmgren is with the San Diego County Water Authority bringing San Diego County much needed Colorado River water. They are now studying ways of doubling aqueduct capacity to about 200 cubic feet a second. Holmgren was president of the local American Society of Civil Engineers last year and attended the national meetings in Mexico City. He visited Berkeley over Thanksgiving and saw Fred Hewes. Richard, Jr., graduates from M.I.T. in June and Sr. expects to come east at that time. We all hope to see him. C. W. Hyde, 2909 Mapleshade Road, Ardmore, Pa., is at present with Mack and Company, supervisor of the Wilmington, Del., office.

Roger T. Hall writes the following from Washington: "To me it's always interesting to scan the class notes in *The Review* and learn about the joys and sorrows of the other fellows in this cockeyed world of ours. Then I realize — at least once a year — how little has been my contribution to the notes. That is mainly due to the fact that I have nothing very cheerful to tell. No one cares or wants to hear about strikes, feather bedding, lack of progress on construction work because of this or that shortage and so on — and continually since the war that's been my story — with some relaxation and relief from it in the winter when we steal away to Florida. Haven't seen any of the fellows except Ted Saunders so no news except that he's fine and doing a grand job in the Navy. My wife and I would warmly welcome any classmates who are passing through — same old address."

We have received word that Frederick W. Barney has moved from Chicago, Ill., to 2719 Northeast 20th Court, Ft. Lauderdale, Fla.; also that Laurence W. Cartland has moved from South Dartmouth, Mass., to A.P.O., E.C.A., Industry and Mining Division, in care of Postmaster, San Francisco, Calif. Brian P. O'Brien has moved from Rochester, N.Y., to American Newspaper Publishers Association Laboratory, 42 South 3d Street, Easton, Pa. Your Secretary would like to receive more news from the Class so that you will have more to read when *The Review* is published. — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. ALAN G. RICHARDS, *Assistant Secretary*, Dewey and Almy Chemical Company, 62 Whittemore Avenue, Cambridge 40, Mass.

• 1920 •

Here we are already well into our 30th reunion year and you should be making definite plans to be on hand at the Sheldon House, Pine Orchard, Conn., for the week end of June 9. Al Glasett and his reunion committee have plans well under way, so we can assure you it is going to be the best yet. Even at this early date, it will give your hard-working committee a lift if you will get in touch with Al, whose office is at W. J. Barney Corporation, 101 Park Avenue, New York City, or with me, to let us know that we have your interest and support and promise of attendance.

A welcome letter from Bill Freeman contains the news that he is now at the Embassy of the United States, 2 Avenue Gabriel, Paris, where he is European manager of the Bureau of Federal Supply. Bill spends about half his time in Paris and the rest in England, Belgium, Holland and Italy. He says that it wasn't easy to give up country life in Virginia where he had 30 acres of open country with cows, horses, pigs, dogs, and so on. It is quite a contrast to his small penthouse in Paris where he and Mrs. Freeman reside while their two sons are in school and college here in America, as is his married daughter. Bill says he'll be glad to see any classmate who gets to Paris. — Phil Byrne has been appointed associate chief engineer of the Esso Engineering Department of the Standard Oil Development Company. He is living at 28 Canterbury Lane, Westfield, N.J. Ed McCarthy has been elected a vice-president of the Gamewell Company in addition to his duties as general sales manager. Ed has been with the Gamewell Company ever since graduation. He is living at 41 Cliff Road, Wellesley Hills. J. Harold Stacey of Windsor, Vt., is speaker of the Vermont House of Representatives and has recently been elected a director of the Central Vermont Railway.

Tony Anable, who is personnel director, among other things, at the Dorr Company, is now living on Old Long Ridge Road, Stanford, Conn. I was disappointed not to see Tony at the Chemical Show in New York in December or at the meeting of the Public Information Committee of the M.I.T. Committee on Financing Development which took place at the same

time. However, I did see Hank Caldwell at the Chemical Show and can report that he is as chipper and as youthful in appearance as ever, despite his heavy schedule of traveling here and abroad for the Swenson Evaporator Company. He went to South America for them not long ago. — Colonel Lincoln B. Chambers has left Washington and is in Sacramento, Calif. Fred Earle is also in California at Santa Ana, 201 Edgewood Road. Arthur Williams has left Chicago and is living in Downers Grove, Ill. Peter Woolf is in Providence, R.I.; address, 311 Canal Street. Edward Ellsberg, captain, U.S.N.R., is again in the limelight because of his best seller, *No Banners, No Bugles*. The book gives an account of his heroic efforts in clearing the wrecks out of the various harbors of North Africa. With little or no equipment, he did a remarkable job, as everyone knows. Later, he went to Normandy to assist in the construction of the artificial harbors for the invasion.

The New York *Sun* recently contained a feature story about our own Flossie Fogler Buckland. She spoke at the American Society of Mechanical Engineers' annual meeting in New York and she had some interesting things to say about engineering as a career for women: "The small number of girls in engineering courses is the fault of the courses, not of the girls," according to Flossie. She goes on to point out that "Physics courses are based on hammers and nails and puppy dogs' tails and not on sugar and spice and everything nice. . . . Discussion of the properties of matter," says Flossie, "could easily include the density of a cake of Roger & Gallet soap rather than a chunk of iron. . . . One block in the path of women seeking careers in engineering is the masculine background of education," according to Flossie. "Educators," she asserts, "do not realize how interesting engineering can be to women if its fundamentals are presented from the feminine point of view and it is not surprising that most women find it hard to become interested in what looks like a man's work." — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

• 1921 •

Jack Sherman of the Research and Statistics Department of the Federal Reserve Bank of Boston sent a welcome letter of holiday greetings with the news that his daughter, Margaret, is a junior at Mt. Holyoke and little David was three last month. Jack enclosed a clipping from the December issue of *Iron Age*, reporting that Alexander Lapointe has been made manager of the process engineering laboratory of the Lincoln-Mercury Division, Ford Motor Company, Detroit. In his charge is the chemical engineering research done by the laboratory on paints, enamels, oils and greases used by the division. Chick Kurth sent a clipping about Reg Smithwick with Christmas wishes from Frieda and himself. We are very much in favor of this helpful and practical addition to friendly Xmas greetings and greatly appreciate the aid it provides, — especially during the busy holi-

day season. According to the Boston *Herald*, Reg was elected chairman of the special legislative commission of the Commonwealth of Massachusetts to study methods of alleviating high blood pressure. Reg, who is surgeon-in-chief of Massachusetts Memorial Hospitals, was named to the commission by Governor Dever. Not to be outdone, Ray and Helen St. Laurent accompanied their cheery greetings with another clipping about Reg and the further information that Howard F. MacMillin recently toured the eastern seaboard up through New England and was a visitor in Manchester. Pending receipt of an up-to-date story promised by Howard, it will be recalled that he heads the MacMillin Engineering Corporation of 6806 North Clark Street, Chicago 26, Ill., a consulting organization specializing in hydraulic power systems and presses. His eldest son is in business with him and he has a married daughter. The second son is at Wooster, anticipating entrance to M.I.T., and the youngest boy is in prep school.

Jack and Elizabeth Barriger sent a most attractive greeting with a homey scene depicting the engineers hanging a Christmas wreath on a giant Monon Diesel locomotive at a stop on the Chicago, Indianapolis and Louisville Railway down line in the Indiana countryside. Dugald C. Jackson, Jr., Elisabeth and son Daniel prepared a special illustrated message in rhyme as has been their custom for many years. Daughter Elisabeth, sons Dugald, III, and David are married and, together with the two grandsons, the Jackson family now totals eleven. Bob and Helen Miller contributed a choice example of their superb photographic and artistic technique, showing them with their fine looking group of six children. Harry and Catharine Field, from out in the Paradise of the Pacific, are represented in an excellent photograph with their big sons, Harry, Jr., and John, amidst the scenic beauty of a Honolulu background. Roy Hersum worked into his greetings an unusual structural treatment of the new Richardson Junior High School of Attleboro, Mass., in which his engineering firm has played such an important part. Most welcome greetings also came from Helier and Graciela Rodriguez of Havana, Phil and Edna Coffin of Pittsburgh, neighbors Max and Ethel Burckett, together with those from Janet and Everett Farmer'22, and children Jean, Jack and Allen, Jack Keck'23, Art Lunn '09, Milicent and Joe Maxfield'10, Regina and Gus Munning'22, Pat and Mac Nyhen'36, Nell and Lem Tremaine'23 and little Russell.

The book section of the New York *Herald Tribune* announced the publication of Dave Woodbury's latest book, *A Measure for Greatness*, a biography of Edward Weston, electrical inventor and founder of the Weston Electrical Instrument Company. The book is published by McGraw-Hill and is priced at \$4. Apparently in a less accurate moment, the same great newspaper reported the Chicago Oak Brooks as 1949 winners of the National Indoor Open Polo Championship despite Ed Farrand's advice that the organization he founded and manages, the North

Shore Polo Club, won the western Eliminations and then the title by crushing the eastern winner, the Squadron A Turtles of New York. Mr. and Mrs. G. Frank Lord of Great Barrington, Mass., have announced the engagement of their daughter, Melissa, to Dr. Frederick D. McCandless of the staff of the Albany Hospital, Albany, N.Y., and instructor at Albany Medical College. Miss Lord, who studied at Cornell and Yale Art School, was graduated cum laude from Mt. Holyoke last June and is doing graduate work at Columbia. Her father is vice-president of Wheeler and Taylor, Inc., of Great Barrington.

Homer N. Wallin, rear admiral and commandant of the Norfolk Naval Shipyard, Portsmouth, Va., took part in the ceremonies at the yard, transferring command of the Navy's only active battleship, the *Missouri*. Bob Neyland, brigadier general and for many years the head coach of the Vols, the University of Tennessee football team, has been in the news for his opposition to the two-platoon football system. One of the Tennessee boys told us that Bob likes big rugged boys who can play an entire game — no doubt based on what it took for him to win the Distinguished Service Medal, the Legion of Merit and the award of Officer in the Order of the British Empire during his five years of service in World War II. Speaking of war service, we were pleasantly surprised, during a luncheon visit to the University Club of Cleveland, to see the name of Allen Addicks displayed at the top of the service list. *Electrical Engineering* for December lists A. B. Kinzel as a member of the executive committee of the Engineering Foundation. Gus is vice-president of the Union Carbide and Carbon Research Laboratories. Franklin O. Carroll, major general and former director of Research and Development of the Air Materiel Command, Wright Field, Dayton, Ohio, has been assigned to the headquarters of the United States Air Forces in Washington. King-Chau Mui, who has been the Chinese Consul General in Honolulu, is now in the Legation of the Republic of China in Havana, Cuba. New addresses have been received for Julius Gordon, Stanley N. Juthe, Alexander M. McMorran, Dorothy R. Pierce, Joseph J. Schaefer, Edward W. Sherman, Jr., and Charles W. Tucker.

It is with deepest regret that we report the passing on August 1, 1949, of Henry Richard Oster, rear admiral, United States Navy, and at the time of his death, Bureau of Aeronautics General Representative, Western District, Los Angeles, Calif. A native of Utica, N.Y., Admiral Oster was graduated with distinction from the Naval Academy. Following service in World War I and promotion to lieutenant (j.g.), he was transferred to the Construction Corps and took his master's degree with our Class in Course XIII-A. He was promoted to lieutenant commander and served in the New York Navy Yard as material officer and shop superintendent. Transferred to the line for aeronautical engineering, he became assistant chief engineer and assistant manager of the Philadelphia Naval Aircraft Factory. After a tour of duty, designation as a na-

val aviator with operations service at the Norfolk Air Station and on the Carrier *Lexington*, he returned to the aircraft factory as its chief engineer. In 1937, he became assistant head of engineering of the Bureau of Aeronautics. During World War II, he saw service on the staff of the Aircraft Battle Force, the Pacific Carrier Fleet and the Pacific Aircraft Command. He was advanced to the rank of commodore and subsequently made head of engineering and then deputy director of logistic plans on the Office of the Chief of Naval Operations. In 1946, he was selected as rear admiral and served as special assistant to the Chief of the Bureau of Aeronautics for material and services until ordered to Los Angeles in 1948. He was the recipient of the Legion of Merit and Commendation Ribbon, the Victory Medal, Escort Clasp, the American Defense Service Medal with Bronze A, the Asiatic-Pacific Area Campaign Medal with three bronze stars, the American Area Campaign Medal and the World War II Victory Medal. He was married in 1934 to Elda Kay of Kansas City, Mo. We are indebted to the Bureau of Aeronautics, Department of the Navy, for courteous assistance in supplying Admiral Oster's record.

Have you answered Zam Giddens? — CAROLE A. CLARKE, *Secretary*, International Standard Electric Corporation, 67 Broad Street, New York 4, N.Y.

• 1923 •

It is too early to report on the results of the class election but if the teller has completed a summary, it will appear in the notes next month. According to the statement sent out with the class ballot, votes received up to the end of the year will be counted.

Colonel and Mrs. Walter E. Richards, U.S.A.F. retired, mailed wedding invitations in November for the marriage of their daughter, Vara Almeda, to Robert Timothy Treacy. The wedding was scheduled for December 17 at the Chapel of Our Lady, Presidio of San Francisco. — I have a new address for Albert J. Pyle, which is 315 West 57th Street, New York 19, N.Y.

In November, your Secretary had a chance to visit both Miami and Havana. At Miami, I had a chance to talk with C. P. Thayer, who has been for a long time active in the M.I.T. Club of South Florida. — HORATIO L. BOND, *Secretary*, National Fire Protection Association, 60 Batterymarch Street, Boston 10, Mass. HOWARD F. RUSSELL, *Assistant Secretary*, Improved Risk Mutuals, 60 John Street, New York 7, N.Y.

• 1924 •

Among the Christmas cards this year, a timely one from Walt Gress who, in addition to his photographic work, is senior designing engineer of the New York City Board of Water Supply. With a picture of a beautiful stream on the front, filled from bank to bank with water, Walt urges on the inside that beer be used as a chaser. With almost two hundred '24 men in New York, think how that would

help if they all took it to heart! And Paul Cardinal makes an unsuccessful attempt to get back into the top productivity spot by including a picture of the family dog in his Christmas lineup. Incidentally, that recent *Life* article on the fertility of the Kentucky mountains might have a few ideas for the vitamin boys. Bill Sturdy sent greetings from the 6th Army, Signal Section, at the Presidio. — And from Old Mexico came Yuletide cheer from the Cornishes. Nish's oldest boy, now in his senior year at the Institute, dropped in recently to pass on the information that his father has switched jobs recently. He's now in the local plant of the Kardex Company in Mexico City; will probably be up here again in the spring to look over his new home office.

Paul Cardinal thinks this one shows how busy we all are. He spent a week in Los Angeles recently and didn't get a chance to look up Phil Bates, new president of the Cabot Chemical Company. Then Phil came to New Jersey, visited Paul's plant in Nutley and never did see Paul. Well, maybe that's what it proves, but it could be they just figured each other for a couple of spies and didn't want a part in any vital vitamin leaks. — A few business boosts in the Class recently: Ray Dorr, who has been with American Mutual Liability for the last dozen or so years, has been made district manager in Philadelphia. Gordon Harvey built so many new facilities as chief engineer of the Genesee State Park Commission in New York that they finally decided he might as well keep them going. So now he is general manager as well. That's about a \$3,000,000 a year business right now. Sometime this year he will become the president of the Rochester section, A.S.C.E. — now vice-president. Along in November, Warren Hill got out of the brush business. At least as far as Pro-phy-lac-tic is concerned. He resigned as its vice-president. Warren said at the time that his future plans were indefinite, except for getting in a good vacation. Another association head: "On November 8, Mr. J. Earl Frazier was elected president of the Pennsylvania Ceramics Association, Inc." Earl is president of Frazier-Simplex, Inc., "engineers to the glass and steel industries." No paid advertising accepted in these columns, you understand, but after all when it comes under the head of news. . . .

In our 25-year report, one of those who was among the missing was Henry R. Tobin. At last he's turned up. Been in the theatre business for some time, is now owner of Keith's Theatre in Fairhaven, Mass. And John Whittington, last heard of in the Bronx, has migrated to California; Torrance, to be exact. Bill Rosenwald got quite a write-up in the *New York Times* recently. Most of us are apt to consider that Bill's philanthropic work takes up most of his time, but here's a brief run-down on what he does on the side: "In 1936 he established W.R. — Capital Enterprises . . . founded American Securities Corp. in 1946 . . . you might catch a glimpse of him reviewing progress on the 53-story office building being erected at Broadway and 39th Street by a new concern in which he re-

cently acquired a major interest . . . active in the affairs of Winter & Company, one of the larger piano manufacturers . . . just taken a part in the formation of Aubrey G. Lanston & Company, dealers in government, state and municipal securities . . . currently working on such varied enterprises as gold mining, a specialty retail business, and a transmission pipe line." Well, that gives you a rough idea. Just goes to show what Course XV can do for a man. Professor Schell please note! — Don't forget our annual get-together on Alumni Day, 1950. It's June 12 at the Copley Plaza Hotel. See you there. — HENRY B. KANE, *General Secretary*, Room 1-272, M.I.T., Cambridge 39, Mass.

• 1925 •

This will be my first "column" since moving to Washington, D.C., where I have been appointed personnel officer of the Operations Research Office of the Johns Hopkins University at Ft. Lesley J. McNair. This office performs, under contract with the Army, a similar function to the M.I.T. organization, the Operations Evaluation Group, which has a contract with the Navy. Both are an outgrowth of the work described by Professor Philip M. Morse, in his Review article, "Of Men and Machines." The director of O.R.O. is Ellis A. Johnson²⁸. Among other items are two which were temporarily mislaid and not turned over to Doc Foster for inclusion in the January Review. There are two items, one in June, and one in October, from the *Waterbury Republican*, concerning the speaking activities of Cuthbert Daniel, X. He is mentioned in one as the coauthor of *A Road to Atomic Peace*, and both refer to his work at Oak Ridge during the War. The *Worcester Evening Gazette* (July 27) reports an interview with Ralph Gow, XV, Executive Vice-president of the Norton Company, and another Norton executive concerning their trip to Europe and their opinion of the effect of Marshall Plan aid there. Reference is made particularly to the enthusiasm with which European workers are pitching into the work of rebuilding industry. They also mentioned that their plants in Germany, Italy and France went through the War virtually unscathed. The *Christian Science Monitor* has a feature article, an interview with Mabel MacFerran Rockwell, IX. The clipping services missed that one — I clipped it myself! The article describes her early career, her wartime service at Lockheed Aircraft where she had charge of work involved in converting handwork processes of fabricating aircraft metal parts and subassemblies to mass production using welding, forming and casting methods, and then gives her views on the use of research to make war unnecessary: ". . . suppose a research laboratory were set up to study the utilization of atomic energy for converting sea water into water for irrigation purposes! Possibly ten years of research would solve this in such a way that, at little cost, the whole of Southern California and the entire desert could be irrigated by the Pacific Ocean. . . . This would open up great areas of land . . . where countless people could

live. Thus we would strike at two basic causes of war; starvation and over-population."

The following item from the October 27 *New York World-Telegram*: "Jersey Central Power & Light Co. today appointed Edward J. Ingram [VI] as vice president in charge of sales, effective November 1. He succeeds the late Thomas R. Dobson." From the *Northampton, Mass., Gazette*, October 29, comes the news that: "Theodore H. Butler has been appointed manager of the Northampton Gas and Electric companies. Mr. Butler was born in Bangor, Me., and was graduated from the M.I.T. in 1925 with the degree in Electrical Engineering. Later he was graduated from the Harvard Business School Advanced Management Program and has studied various night courses at Boston University and Union College." His career with G.E., Stone and Webster Engineering and various New England power companies is mentioned, as well as his wartime service in the Navy Civil Engineering Corps, where, as a lieutenant commander, he directed construction work in the South Pacific and Okinawa. It continues: "Upon his return to civilian life he accepted a position with the Green Mountain Power corporation in Burlington, Vt. as assistant to the president which position he held prior to his acceptance of the position in Northampton. He was married in October 1946, and has one son 14 months old." In a column in the *Washington Star* of October 16 is the item: "Malcolm G. Davis [II], just elected a trustee of the New York Savings Bank is vice president of Gilbert Associates, Inc., international engineering firm, and the son of Herbert L. Davis, Washington attorney." Clippings from Dedham, Mass., Newark, N.J., and Boston papers announce the marriage of Roger Ward, II. I quote from the *Boston Herald* of October 30: "The marriage of Miss Dorothy Dewey Comstock, daughter of Mr. and Mrs. A. Barr Comstock of Washington, D.C., formerly of Boston, to Mr. Roger Ward of Seattle, Washington, took place yesterday afternoon . . . Mr. Ward served in the European theater as technical advisor to the 9th Air Force Bomber Command. He is now with the Boeing Airplane Co. as liaison engineer." The *New Orleans States* for November 3 carries this announcement: "Meanwhile the Esso Standard Oil Co. has announced that M. W. Boyer [X], formerly head of the Baton Rouge operations, and now vice president and general manager of manufacturing, has been named vice president and contact director for manufacturing supply and transportation, as well as of chemical products operations. Boyer managed the huge plant at Baton Rouge until several months ago, when he was made a company vice president. He joined the company in 1927 after being graduated from the M.I.T."

The *Winchester Star* announces the death, on November 12, of George L. Witham, II, of heart disease. He was married in 1927 to Mary Sutherland Ranton, and had lived in Winchester for the past 20 years. The item refers to his friendliness, and hospitality. He and Mrs. Witham had two daughters, Linda and

Carol. Their ages are not given. His first position was an engineering one with the Factory Mutuals, and later, for 18 years, with the American Mutual Insurance Company. The funeral was held on November 13 at the Unitarian Church. Back when we had course secretaries, and Nelson Malone was secretary for Course II, Witham's activities were frequently reported in *The Review*, as they were close friends and both in the insurance field. It is with regret that I report here his passing from life and the work for which he was so well equipped.

As a concluding item, here is a letter from Henry Sachs, V: "Had lunch with Sam Spiker yesterday and we talked about a possibility of going 'back to Tech' next June for our 25th reunion. Myron Doucette, whom I see off and on, also seems receptive. We were wondering what sort of plans were being formulated, and if time wasn't running a bit short. In any event, we thought you would like to know that an interest does exist. I am taking the liberty of sending a copy of this to Leroy Foster. I do hope that this might prove of interest to you and that you agree that it's high time we all got together again." The letter, on the stationery of Frank Crystal and Company, Inc., Insurance, is dated November 17.

By the time this reaches you, the first announcement regarding the 25th reunion should be in your hands. If you have not already replied to the announcement, please get on the ball and shoot something in immediately. The time is, indeed, short and the committee needs every bit of help you can give them. As of December 20, Doc Foster has assumed the chairmanship of the reunion committee. A working committee consisting of Fred Rice, Jim Howard, Ave Stanton, Sam Caldwell, Fred Greer, and Ed Kussmaul are already making plans. All of this group intend to be at the reunion. Tom Price will be there and as of this early date we expect Ben Oxnard, Joe Russell, Henry Sachs, Sam Spiker, Myron Doucette, and your Secretary. — HOLLIS F. WARE, *General Secretary*, 106 Schuyler Road, Apartment 206, Silver Spring, Md., F. LEROY FOSTER, *Assistant Secretary*, Room 5-105, M.I.T., Cambridge 39, Mass.

• 1926 •

Well, here we are again at Pigeon Cove for the week end — remember I told you that the class notes would probably be written here from now on. It's a crisp winter evening and the moonlight is sparkling out there over the sea; don't imagine many of you get to see the ocean during the winter. It can be mighty interesting. Just returned from a cocktail party and I'm sore because I forgot my whittlin'. No, we're not trying to emulate Cal Coolidge. Down here they don't whittle to make shavings. Whittlin' is a profession among the older gentry — they make the pegs that plug the lobsters' claws and if you ever got in the way of an unplugged lobster, you'll agree that it's a noble profession. My problem was different though. We have some bedroom windows that rattle on a windy night and a few well-whittled wedges should

silence them. Speaking of pastimes for the hands, I rode across Harvard Bridge the other afternoon in a cab with a classmate who asked, "Have you ever heard of a grown man making things with an erector set?" I hadn't and asked if this man had children. When I learned that no children were involved, I remarked that if a grown man wants to play with an erector set it sounded as reasonable to me as the hobby of model trains. I must have had a rabbit's foot in my pocket because my friend then confided that he was going to work with his erector set that evening. There's an idea that some of you overworked executives and engineers might toss around; it sounds like a good way to relax. Just about here I expect that many of you are saying to yourselves, "What a lot of hot air," at least I hope you are saying it, otherwise my point is lost. What is the point? Unless there is a pretty good influx of news from the Class, your Secretary shall have to use his imagination; so keep the news coming! Actually, the response has been good, and we want to keep it that way.

I mentioned the Harvard Bridge above — guess you remember it as Gulliver's Xylophone. Well, this fall it became so wobbly that it had to be closed for a couple of months during repairs and Boston's traffic snarled so badly that a system of one-way streets was instituted. The system worked out so well that when the bridge went back into service the streets were kept one-way and take my word for it, one can actually drive through Boston quite a bit easier with the new system. New plans are afoot, however, to make things still better and our Bud Wilbur is the central figure in the engineering setup. A long-range master highway plan for Metropolitan Boston has been projected which will get traffic in and out and around the city easily and rapidly. Part of this long-range plan is known as the Inner Belt route which essentially consists of a circular elevated highway around downtown Boston that will connect at various points with express highways to the north, south, east and west. The first part of this new highway is now being designed as a joint venture of the engineering firms of Fay Spofford and Thorndike and Chas. A. McGuire and Associates, with John B. Wilbur as chief engineer. Bud is also professor of Civil Engineering in charge of the department at M.I.T., so you can guess that he is somewhat occupied these days. I first learned of his new assignment from Jim Killian and then pried the details out of our modest classmate, Bud, one evening at dinner. Essentially, when the thirty million dollar Section I is completed, I'll be able to park my car in downtown Boston, get onto the new two-level highway by ramp at Atlantic Avenue and State Street, sail along over the market district, out over the tracks at the North Station and, thence, north to the new Mystic River bridge or to Cambridge or along the Boston side of the river. The Class is proud to have you associated with this job in the key position and we salute you, Bud Wilbur!

Jim du Pont visited Boston recently on one of his speechmaking tours and we had

planned to get together. His train was late, however, and he had to rush to the hotel where he was making his speech, so we only had an opportunity to talk over the telephone. Jim is in the public relations department of the Dupont Company and has made a real reputation as a speaker. His headquarters are in Wilmington, Del., and he has a real family, two daughters, Penny and Debbie, aged 10 and 8 respectively, and a 16-months-old son, Coli.

Dan McGrew has hit the news again. We read in the *New York Times* recently that Governor Dewey had appointed Colonel Edward J. McGrew, Jr., (that's Dan) to a 10-year term as chairman of the New York State Building Code Commission. Dan was appointed deputy commissioner of public works by the late Mayor Fiorello LaGuardia in 1934, served with the Army Engineers during World War II and returned to become city commissioner of public works. Congratulations, Dan, on the new appointment.

One of our classmates who has reacted to my plea for news is Art Brockelman. Art said that he did not dare to take the copy of *The Review* home in which I mentioned that he was a good executive way back in '26, because we did our thesis together — i.e. I did the work and he got a girl to type it. He was afraid that this reference might weaken his nightly lectures to his two oldest boys to "get after those studies." How time changes things! Art mentioned that the extent of his travels recently was a trip to Aroostook County, Maine, to buy a few trainloads of potatoes and that, of course, he saw no '26 men up there — by strange coincidence Art, you could have met your Class Secretary for I was in Aroostook County at the same time, but not buying potatoes. Art also mentioned that it must be great to be like Austin Kelly — take two years to build a yacht, sink it a week later and then start immediately looking for another one. Are you listenin' Austin? What's the final sequel; did you find another yacht to your liking, or are you coming to Rockport to have another one built?

Thanks again to those of you who have sent along some news and as we mentioned above, keep it coming! — GEORGE WARREN SMITH, *General Secretary*, E. I. du Pont de Nemours and Company, Inc., Room 1420, 140 Federal Street, Boston 10, Mass.

• 1927 •

The Springfield, Mass., *News* brings us up to date on A. J. Connell who has been elected as vice-president and engineering manager of the E. B. Badger and Sons Company of Boston, process engineering and construction company: "Mr. Connell's position as engineering manager, according to the announcement, places him in charge of all engineering, drafting, estimating and procurement. Since his graduation, he has been with the Badger Co., engaged in the company's design and construction of chemical and petroleum plants in this country and abroad. During the war he was responsible for design of aviation gasoline and synthetic rubber plants erected by the company." — E. H.

Bramhall writes as follows: "I seem to be back in Washington after a three-year stay at the University of Hawaii. This time with the Operations Research Office, Johns Hopkins University, where we are trying to make ourselves useful to the Army."

P. C. Eaton, Associate Dean of the California Institute of Technology, Pasadena, has the following news items to report: "After the War, in which I rose slowly to the exalted rank of lieutenant commander, U.S.N.R., by dint of avoiding death by freezing in the North Atlantic and an equally unattractive end by roasting in the South Pacific, I went back to M.I.T. with the idea of staying put. Cal Tech spoiled this plan by offering to make me a dean out here, and since 1947, with the exception of summers in Maine, here we've been. Two small children (Jeremy, four and one-half and Rebecca, two) prevent us from growing old as gracefully as we should." — Don Campbell was recently promoted to the position of chief process engineer of the Standard Oil Development Company, the research and development affiliate of the Standard Oil Company of New Jersey. — "Early in November the Springfield Armory was host to the Southern New England Section of the S.A.E. and their guests for an inspection trip through the manufacturing facilities and the arms museum. Paul S. Vaughan, mechanical engineer in charge of Diesel engine design for the American Locomotive Co., spoke at the Hotel Sheraton on 'Locomotive Diesel engines.' He is considered an outstanding authority on this subject and illustrated his talk with slides."

David G. C. Luck is the author of *Frequency Modulated Radar*, published in November by the McGraw-Hill Book Company. Dr. Luck is now research engineer with the R.C.A. Laboratories Division of the Radio Corporation of America. He received his Ph.D. degree in 1932 from M.I.T. and held fellowships or part-time staff positions in the Physics Department during his graduate studies. In 1932, he joined the Research Division of R.C.A. Victor Company as research engineer, transferring to R.C.A. Laboratories Division upon its formation in 1942. He has been active throughout his professional career in application of electronic techniques to problems of instrumentation, particularly in the field of aids to aviation. — Richard Cutts, Jr., has been named manager of sales for the central station divisions of the General Electric Company's Apparatus Department. — JOSEPH S. HARRIS, *General Secretary*, Shell Oil Company, Inc., 50 West 50th Street, New York, N.Y.

• 1930 •

Fred Dickerman has been promoted to the position of chief engineer of Chance Vought Aircraft in Dallas. After graduation Fred taught physics at Robert College in Istanbul, Turkey, and has been with Chance Vought since 1933. Starting as a draftsman, he advanced through the posts of project engineer, chief of design, and assistant chief engineer. Greg Smith is chairman of the policy committee of the United Council on World Affairs. He

was a recent speaker in Ipswich, Mass., on "The United Nations in Action." Bob Reynolds will be Scotty's right-hand man on the 20-year reunion committee and will handle the publicity. The reunion will be held at Riversea Inn in Saybrook, Conn., on June 10 and 11, 1950, the week end immediately before Alumni Day on the 12th. We had a great time at the Riversea in 1940 and are looking forward to an even better celebration of our 20 years as alumni. Won't you plan to be there? — PARKER H. STARRATT, *General Secretary*, 1 Bradley Park Drive, Hingham, Mass. *Assistant Secretaries*: ROBERT M. NELSON, 2446 Iroquois Road, Wilmette, Ill.; ROBERT A. POISSON, 105 East 88th Street, New York 28, N.Y.

• 1937 •

Phil Peters was in Minneapolis recently and during dinner with him, he provided the Assistant Secretary with the following news: Phil had recently seen Al Busch, who is vice-president of the Keuffel and Esser Company and lives in Short Hills with his charming ex-Wellesley wife, Tommy. Bob Ferguson is still in Chicago as assistant chief engineer at the Carnegie — Illinois Steel Corporation. Phil reports, too, that his recently acquired "mansion" is kept dry on the inside courtesy of (not free) the Thor Roofing Company, president of which is our own inimitable Bob Thorson.

I also understand that Ed Hobson is still with Monsanto in Springfield, Mass. As for the purveyor of all this news, Phil is looking well and prosperous as the sales director, group insurance department John Hancock Insurance Company, Boston. Bill Burnet, who I reported recently as recovering from Polio, continues to do well. He will soon return to work, at least part time, at the Superior Separator Company in Hopkins, Minn., where he is chief engineer. — WINTHROP A. JOHNS, *Secretary*, 34 Mali Drive, North Plainfield, N.J. WALTER T. BLAKE, *Assistant Secretary*, Research Products Development Division, Pillsbury Mills, Inc., Minneapolis, Minn.

• 1939 •

A roundup of the latest news filtering through produces the following: Bob Frank was married earlier this year to Anne Byck Green of Houston, Texas. They are making their home in New York City. An announcement from Joe Zallen, Counselor at Law, states that he moved his office recently to 6 Beacon Street in Boston where he is continuing his specialty in patents, trademarks, copyrights and so on. Henry Meadow's appointment as executive secretary of the committee on research and development at Harvard University was announced in October. Since 1945, he has served as coordinator of industrial research at the University of Rochester. Alex Thackara, who works as development engineer with the Mason-Neilan Regulator Company of Boston, has finished a season of hard work as chairman of the annual Red Feather Campaign for his home town of Westwood, Mass.

In the small pink envelope department, the arrival of Lucy Barker Cooke was proudly proclaimed by Fred and Eugenia Cooke on October 31. Dick Gaines, who now holds a teaching fellowship at Harvard while completing work for his doctorate, also made news by his marriage to Dorothy Ann Brown of Rutland, Vt. Our coeds continuing their post-graduate prominence are represented this time by Esther Garber who was recently appointed a teaching fellow at Northeastern University. Still more weddings include the one between Joe Bayer and Lou Emma Miller of Middletown, Ohio. We are a little late with this item but it is worthy of mention, nevertheless. Charlie Washburn, last spring, was named as one of four new incorporators of the Middleboro Savings Bank in Middleboro, Mass.

A letter from Meade Bolton '16 encloses a Panamanian newspaper replete with a picture of Frank Morales, Jr., who is mentioned as a distinguished engineer in the Canal Zone. Although some difficulty was experienced in understanding the Spanish, it is surmised that Frank is doing an outstanding job in the civil engineering field in that location. Another wedding not mentioned previously is that of Ralph Tucker to Katherine W. Davis of Brookline. They are presently residing in Springfield, Mass. The November 28 issue of *Time* magazine carried an interesting article in the "Canada" section about Champlain Village along Montreal's Sherbrooke Street East where Al Miller is in charge of constructing a large, private, low-cost housing development, said to be the largest such enterprise in Canada. The final result will be 400 houses, each with 4,000 square feet of land; the first 65 are already sold.

Two more weddings noted in the news are those of Ed Morin to Mary K. Van de Water of Summit, N.J., and one anticipated last June: Dick Cella to Georgena Brannon of Carnegie, Okla. — STUART PAIGE, *General Secretary*, 701 Mill Plain Road, Fairfield, Conn. ROBERT C. CASSELMAN, *Assistant Secretary*, 42 Holman Road, Auburndale 66, Mass.

• 1940 •

The BIG news is 10th reunion news of the Class. Robert Bittenbender has been appointed as reunion chairman, 287 Waban Avenue, Waban, 68, Mass.; and Hap Farrell is lending his able assistance, Valley View Road, Weston 93, Mass. The class reunion will start on June 10 and continue through June 12. So save the week end of June 10, including Monday, June 12, which will be Alumni Day, 1950. There will be class officer elections at this time for the next five-year period, a chairman of the elections committee will be announced soon. As we gather from both Bob and Hap, our class reunion will be informal and yet have all the advantage of a formal week end. We will have some hotel facilities near or in Boston for registration and reunioneing. The chairman does not plan at this time to "entertain" the members who come back but rather to have as many functions as possible in which the members will, or can, entertain themselves. The success of the reunion

will depend on creating the proper mental approach of those who come back; each one coming back will have a reason of his own, some to see Technology, some to see old friends, and some will just be curious and want to show their families around. We want all to come, each and every one to have a good time.

Hyman M. Freedman, a lieutenant colonel, has reported to Headquarters, New England Military District, for a short tour of active duty training. He has been assigned to the G-3 Office of the Organized Reserve Corps at the Army Base in Boston. — Schrade F. Radtke, who received his doctor's degree in inorganic chemistry, has joined the Du Pont Company's pigments department in Newport, Del. — Kenneth Davis is now an associate professor of engineering at the University of California at Los Angeles where he says they are trying to organize a chemical engineering department in the new college of engineering. Before that, he spent some time in Chicago for Ford, Bacon, and Davis as head of the technical division. Kenneth has three children ages seven, five, and one-half years. — William S. Mounce, researcher for the New England technical section, International Nickel Company, addressed the Worcester section, American Society for Metals, on the subject, "Nickel as an Alloying Element in Steel." Plastic and Rubber Products, Inc., announced the appointment of Harlan H. Davis as Chicago office manager. A book, *Advanced Calculus For Engineers*, has been published by Prentice-Hall, Inc. Its author is Francis B. Hildebrand, Assistant Professor of Mathematics at M.I.T. Samuel A. Goldblith received his Ph.D. degree from M.I.T. last February.

Wedding announcements which have come to us are as follows: Jay Zeamer and Barbara Ferner; Bill Lamb and Patricia Wise; Ian MacIntosh MacLeod to Irma Pompan; Oliver Henry Fulton to Sally Anne Harrison; Kenneth A. Lish to Norma Katz; Marshall Greenspon to Helen Blumenthal; A. P. Rockwood to Jean Velma MacLachlan; and John J. Piotti, Jr., to Jeannette C. Therrien. — Remember, save June 10 to June 12, 1950. — H. GARRETT WRIGHT, *General Secretary*, in care of Garrett Construction Company, Main Post Office Box 629, Springfield, Mo. THOMAS F. CREAMER, *Assistant Secretary*, 6 Berkley Road, Scarsdale, N.Y.

• 1947 •

It is still too early for my appeal for letters, cards, telegrams, or what have you, to have had any effect, so I'm still relying on personal contacts and the very efficient press-clipping bureaus to provide you with news of our classmates. At the beginning of December, like an engineer true to his profession, I went over to the open house at the Supersonic Wind Tunnel (also it was an extra hour off from work). There I saw Jerry Cox gawking at the marvelous piece of machinery along with the rest of us "laymen." Jerry was there with his Dad and reports that he has his master's degree now, and is forging on for the doctorate in the acoustics

laboratory. Some days later, while braving the perilous journey out to my residence in Watertown, I met Al Steinmayer and his very charming wife who also live in the unexplored wilds of postal district 72. Al was very much the proud papa in displaying a small portrait of his year-old daughter, Karen. One Sunday not so long ago, I was taking the air in Harvard Square and bumped into Vince McKusick. Vince will be departing Harvard Law School after the three-year grind this June. He seemed very chipper, but I must report an extra gray hair or two.

Bill Shempp '48, who was formerly associated with our laboratory, writes to the office from Oak Ridge, Tenn., that Leo Celniker is with an aerodynamic project at that fine atomic establishment. Speaking of our office, the engineering ranks have been swelled by the addition of another classmate, Ken Wetmore. Ken took a brief respite from the rigors of aeronautics which should illustrate the adaptability and virtuosity of Technology trained engineers. After leaving the Wright Brothers Wind Tunnel in September of 1948, Ken joined the Fall River Shipyard in Quincy where he was with the central technical department testing the installation of shipboard machinery. He seems well pleased to be back in the fold doing structural analysis with the Aero-Elastic and Structures Research Laboratory. Bob Baldwin is back in New York after spending several months in North Carolina working on a project for the American Machine and Foundry Company. Mort Loewenthal has given up teaching at the Institute and is with the Sylvania Electric Products, Inc., in Boston. The National Research Corporation proudly announces the acquisition of Noble Hamilton. Noble will be engaged in the research in the application of high-vacuum to high-temperature alloys. Jordan Baruch has been awarded the Armstrong Cork Company fellowship by the acoustics laboratory.

Only one engagement to announce this month, but that's certainly going to be a long one. Chuck Fullerton and Catherine Juliet Carter of Newton don't plan to tie the knot until next September. The lone wedding to report is that of Pete Schwab to Madeleine Renee Guilfoyle of Brooklyn, N.Y., in November. Pete is a field service engineer with the Sperry Gyroscope Company.

Tom Cheatham and wife took a ship at the end of October for Bergen, Norway, where Tom will teach and continue his electrical engineering research with the Institute for National Defense. Luther Chien has also been doing a little educating on the side. He delivered a talk entitled, "The Chinese People and Three Thousand Years of Tradition" to a Westville, Pa., Parent-Teacher's Association gathering. Luther is with the Du Pont Company as a research chemist. Forgot to mention in the last set of notes that while overseas, I also heard a number of times (2) from Dick Scheuing, besides the others I listed. Dick manages to sandwich in night classes in industrial management at New York University with his engineering work at Grumman, and also writes that he frequently runs up to Boston to

visit friends at the Delt house. We have yet to see him up here, however. Arnold Judson and his wife, June, drove up from Providence early in December to hear the Musical Clubs' annual performance of Handel's "Messiah." Jud has been switched to the night shift at his plant, but has been promoted to foreman, which should be a compensating factor. Russ Johnston and Don Harleman spent the summer touring Europe. Don returned to the Institute in the fall and Russ has joined the faculty of Lehigh University as an assistant professor in the Civil Engineering department.

Two of our classmates whom some of you may remember from way back — Marc Jartman and Bob O'Brien — were graduated from West Point last June and have accepted commissions in the Army as second lieutenants. Marc is serving in ordnance, and Bob in the signal corps. Joe Kleiman, an engineer with the Independent Lock Company of Fitchburg, renewed a long-time association with the Army last summer with 15 days flying with the Air Force Reserve at Bedford. Teaching seems to appeal to any number of our classmates. John Turnbull is now an associate professor in the School of Business Administration at the University of Minnesota; Bob Eppele has been advanced to the post of assistant professor of Chemistry in Brown University; and Martin Essigmann has been moved up to associate professor in the department of Electrical Engineering at Northeastern University. Also, Bill Lynch now holds an assistant professor's post in Civil Engineering at Cornell University, after some time with the firm of Camp, Dresser, and McKee in Boston. George Brooks, in his second year at Harvard Divinity School, has been called by the Unitarian-Universalist Church in Danvers to serve as its minister. Hank Linton has joined the Du Pont Company's plastics department as a research chemist at the Arlington, N.J., plant; and Frank Worssam is now employed by the Citizens' Utilities Company as a divisional electrical engineer at Kingman, Ariz., after a two-year training course with the New Jersey Bell Telephone Company.

Personal enterprise at its best has been demonstrated very ably by a number of fellow graduates. Sumner Long has organized the firm of S. A. Long, Inc., of which he is president, and which is to specialize in general cargo and tanker chartering and ship sales. Sumner obtained his experience in the shipping line with the Lincoln Ship Brokerage Company, and as assistant director of tanker operations with Ocean Freight and Brokerage Corporation. — Boston art circles were recently treated to an unusual exhibition of ceramic ware in the form of porcelain portrait medallions, the work of Adelaide Toombs. Adelaide, listed in *Who's Who in American Art*, is the only artist today to use porcelain in this unique representational manner, specializing mainly in the likenesses of children. — Weather Advisors, Inc., is the name of a new and very enterprising firm founded by two Technology graduates. Parker Chick, in partnership with Marion Hogan '46, is mentor of the organization which

provides weather forecasts for industrial firms, and towns and cities all over New England. Their service is said to save companies a good deal of money by forewarning them of weather changes that might affect business. Parker and Marion employ a staff of ten at their headquarters at Logan Airport. — Bob Harrison, we learn, is the supervising engineer of the power room of *The Dallas News*, of which *The News* seems justly proud. According to their article, Bob “looks like an executive a lot of his time, but has more fun when he’s tinkering with his gadgets.” Also from Dallas we hear that Sebron Haley spent a short visit in that fair city before going on to make his home in the equally fair rival (no controversial issues in this column), Fort Worth. Finally, Bob Michaud is out here in the east with Raytheon of Waltham.

A correction to my earlier statement about a single engagement. While browsing through *The Wellesley Alumnae Magazine* just before press time, I noticed the engagement announcement of Bill Bursnall to Karen Walley. — CLAUDE W. BRENNER, *General Secretary*, Room 23-130, M.I.T., Cambridge 39, Mass.

• 1948 •

Weddings occupy a prominent place in the news for the month of February. Richard Quinn married Helen Stellato in December. Harry Parke and Ursula Gorman were married in November at a wedding in West Roxbury, Mass. Richard Sweeney was married to Jean J. Mower

of Lowell, Mass., at a wedding in that city. George Ingham and Adele Castagnetti were married in Framingham, Mass. Robert Mayne took Dorothy Mulvehill of Philadelphia for his bride in October. Frank McGowan and Elizabeth A. Williams of Brockton, Mass., were married in that city. Russell Gwillim was married to Elda Ewing of Taunton. Last to be mentioned is the wedding of your Assistant Secretary to Rosemary Marble of Worcester. We live at 19 Lancaster Street in Worcester and are interested in hearing from any of you who pass through Worcester. Engagements reported for this issue include those of Harlow Farmer, Jr., to Sue Shafer of Durham, N.H., John Clifford to Mary Lawless of Dorchester, and Peter Bolan to Ruth McCarty of Great Barrington.

Joseph Salerno has taken up a post as instructor of electrical engineering at Clarkson College in Potsdam, N.Y. Victor Dawson is now working for the Carrier Corporation in Syracuse, N.Y., on air conditioning research. He will soon change his employment to the F. C. Dawson Engineering Company of Boston. Daniel A. Lanciani is working on microwave radar equipment design in the Boston plant of Sylvania Electric Products, Inc. He works with Holmes Taylor and Arthur Brusila. Arnold Smith is working with the Bigelow Sanford Carpet Company in Hazardville, Conn. Arnie lives at Shaker Road and reports that he would welcome visitors like a raise. Benjamin Dann is employed by the Hendrick Manufacturing Company in Carbondale,

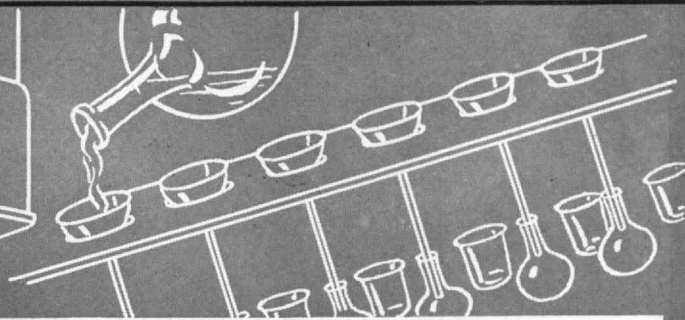
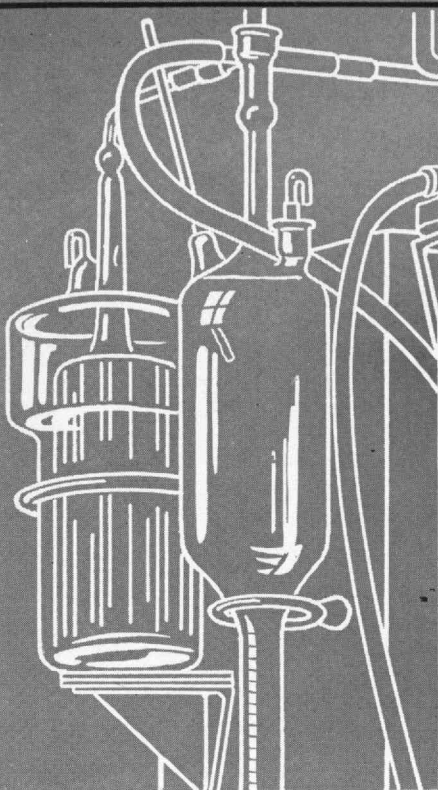
Pa. Joel Rossen is at M.I.T. in the Division of Industrial Cooperation working on the deterioration of adhesives. Charles Deane is doing architectural design work with the firm of Thomas Worcester, Inc. Charles Mastroeni is working for General Electric in the test engineering program at East Lynn, Mass. He is spending his spare time at local Y.M.C.A.’s in weightlifting, and he would like to know where Art Teager is located. William Galloway is working for the Boeing Airplane Company on servomechanisms research. William Joyce is a lieutenant in the Army Engineers and he is an administrative officer at the present time. He has been in contact with Ernest Hader and Norman Herbert who were also drafted into the Army. Harvey Taylor is working in the structures department of the Bell Aircraft Corporation. Mario DiQuilio, Al Seville, Frank Anthony’49, and Dan Fink are all working at Bell with him. Steven Anastasion is serving on the U.S.S. *Coral Sea* where he has been working with John Chase. Robert Gurney is employed in the testing and development laboratory of the Boeing Airplane Company. John Jones and Mark Kirchner are also employed by Boeing. Howard Jacobson is working in the Jacobson Company. He has been enjoying the company of Robert Stern and Herbert Kindler. — WILLIAM R. ZIMMERMAN, *General Secretary*, in care of Kurt Salmon Associates, Inc., 3000 Albemarle Street, Washington, D.C. RICHARD H. HARRIS, *Assistant Secretary*, 19 Lancaster Street, Worcester, Mass.

ALUMNI DAY, MONDAY, JUNE 12, 1950—

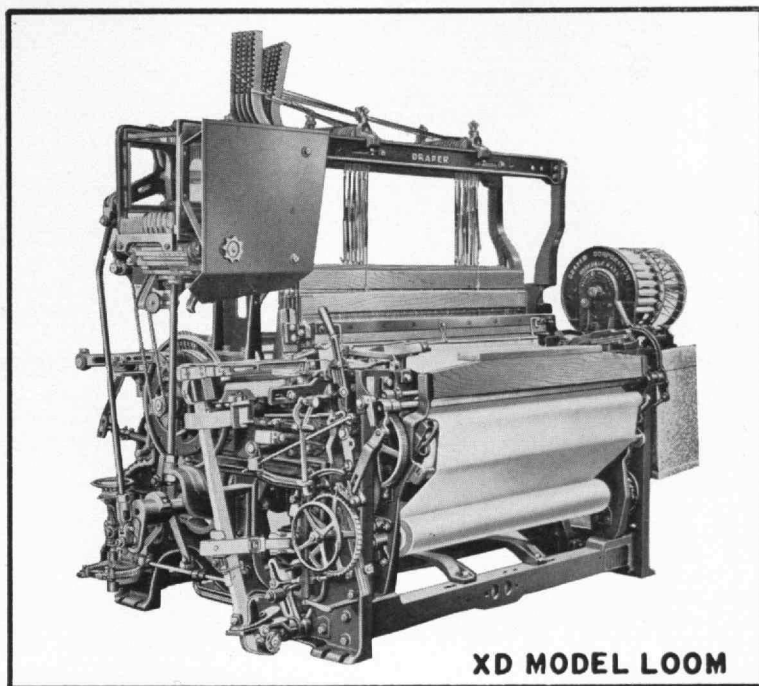
provides the once-a-year opportunity for you and your family to:

- (1) Revisit Cambridge and see what’s new at the Institute.
- (2) Chat with members of the M.I.T. Faculty and Staff.
- (3) See the new Charles Hayden Memorial Library in use.
- (4) Have luncheon in the Du Pont Court with your friends and classmates.
- (5) Take part in the afternoon symposium.
- (6) Meet with Dr. and Mrs. Compton and President and Mrs. Killian.
- (7) Attend the Alumni Banquet at the Copley Plaza in Boston for the ever popular “stein-on-the-table” banquet.
- (8) Take home a souvenir stein for your collection.

Best of all, since Alumni Day falls on Monday, you can combine your visit to the Institute with your own class reunions of the week end of June 9–11.



Chemical Research



XD MODEL LOOM

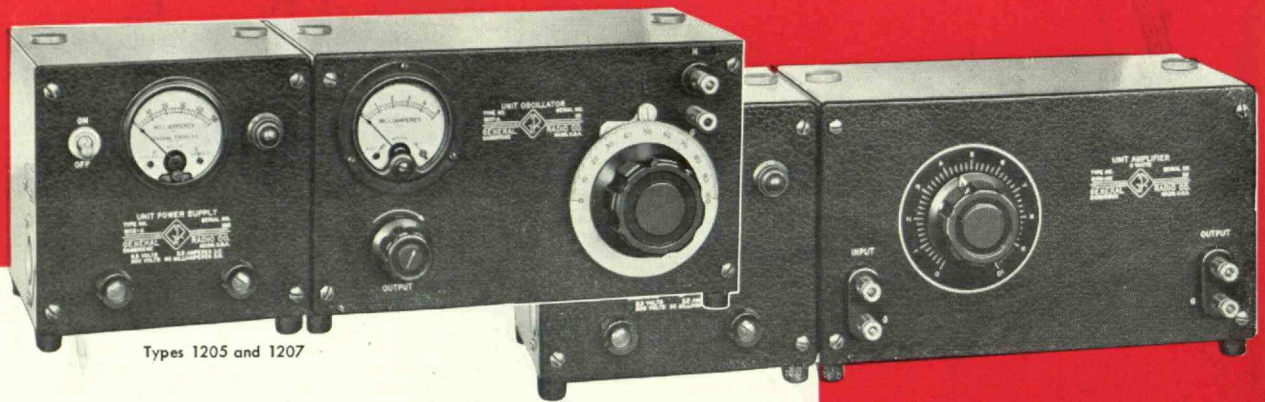
Chemistry plays a large part in modern manufacturing. Draper chemists work along with the physicists in attempts to find new and better basic materials. They maintain a constant check on the chemical properties and the analysis of materials used in production. Furthermore and of great importance are the frequent tests they run each day on the melt of the cupolas, in order to assure the proper quality of the iron for castings.

Thus the Draper chemists not only endeavor to maintain present quality in raw materials used, but also continually search for something better in order that Draper products will remain the leaders in the field.

DRAPER CORPORATION
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UNIT INSTRUMENTS



Types 1205 and 1207

Types 1205 and 1206

PLUG-IN • VERSATILE • INEXPENSIVE

THE new G-R line of unit instruments — each complete in itself, with straightforward circuit, good accuracy and adequate shielding — provide means for acquiring the basic measuring instruments for any small electronics laboratory with the minimum financial outlay.

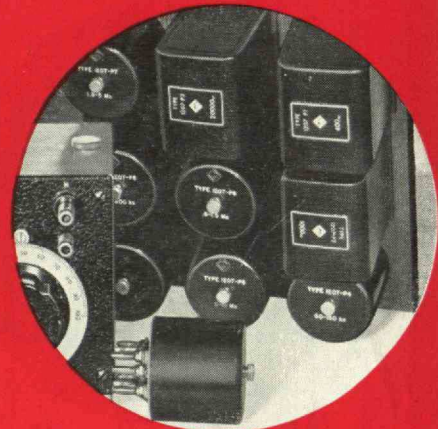
These units are especially valuable in the college laboratory. All of the circuit components are permanently mounted in small, rigidly-constructed cabinets with open wiring which can be modified by students into a wide variety of typical circuits, and then restored to their original design with the minimum of time. Adequate metering is supplied. The accuracies are sufficient for a very large number of routine laboratory measurements, including use with various bridge circuits.

The power supply plugs into each unit, automatically furnishing the latter with proper filament and plate voltages. An accessory Jones plug is furnished so that customer-built units may be plugged into the power unit.

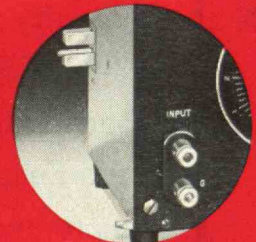
Type 1205-A Unit Power Supply This unit supplies output voltages of 6.3 volts at 2.5 amperes and 300 volts dc at 50 ma. The hum level is 0.8 volt at maximum output load. Connections to the associated unit equipment are made through a multipoint connector mounted in the ends of the instrument. An extra connector is supplied for use with other equipment. **Price: \$55.00**

Type 1206-A Unit Amplifier This amplifier uses two triode voltage-amplifier stages and an impedance-coupled output stage. It has a maximum voltage gain of 45 db with a maximum output of 30 watts. The frequency response is essentially flat from 100 cycles to 100 kc. Above 100 cycles the distortion is less than 2% with 1 watt into a 7500-ohm load. **Price: \$65.00**

Type 1207-A Unit Oscillator With separately available, high-Q plug-in coils this oscillator produces a test signal at frequencies from 400 cycles to 80 Mc at ½ watt maximum output. Seven plug-in coils provide continuous frequency coverage from 70 Kc to 80 Mc. Three fixed-frequency coils supply audio frequencies at 400, 1000 and 20,000 cycles. A blank coil is furnished with each instrument. The frequency stability is adequate for most routine laboratory uses except when highly selective tuned circuits are involved. **Price: \$73.00**



Seven plug-in coils cover the range of 70 kc to 80 Mc; three coils provide fixed frequencies of 400, 1000 and 20,000 cycles. Prices: from \$9.00 to \$19.50 each



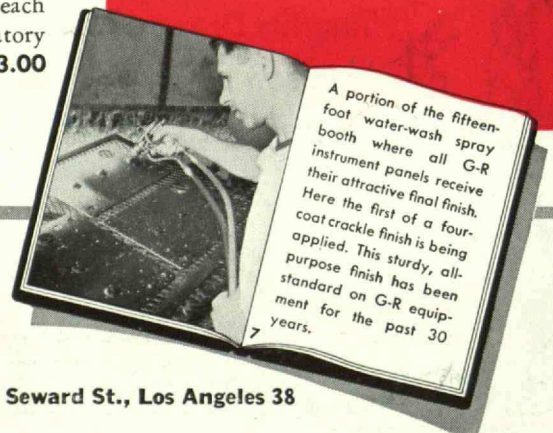
Each unit is equipped with a multipoint plug (at rear) to pick up filament and plate voltages from the power supply. Small plug at front insures adequate mechanical connection between separate boxes



GENERAL RADIO COMPANY

Cambridge 39, Massachusetts

90 West St., New York 6 920 S. Michigan Ave., Chicago 5 1000 N. Seward St., Los Angeles 38



A portion of the fifteen-foot water-wash spray booth where all G-R instrument panels receive their attractive final finish. Here the first of a four-coat crackle finish is being applied. This sturdy, all-purpose finish has been standard on G-R equipment for the past 30 years.